Population Status of Migratory Game Birds in Canada

(and Regulation Proposals for Overabundant Species)

November 2004

Canadian Wildlife Service
Waterfowl Committee

CWS Migratory Birds Regulatory Report Number 13

Environment Canada   Environnement Canada
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Canada

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Background

Canadian hunting regulations for migratory game birds are reviewed annually by Environment Canada, with input from the provinces and territories, and a range of other interested stakeholders. As part of this process, the Canadian Wildlife Service (CWS) produces three reports each year. The November report "Population Status of Migratory Game Birds in Canada" contains population and other biological information on migratory game birds, and thus provides the scientific basis for management. The December report "Proposals to Amend the Canadian Migratory Birds Regulations" outlines the proposed changes to the annual hunting regulations, as well as other proposed amendments to the Migratory Birds Regulations. These two documents are distributed to organizations and individuals with an interest in migratory game bird conservation, to provide an opportunity for input to the development of hunting regulations in this country. The third report "Migratory Game Bird Hunting Regulations in Canada", issued in July summarizes the hunting regulations for the upcoming hunting season.

Data presented in the November report come from a variety of sources. Breeding population estimates and trends for inland ducks are derived from large-scale systematic aerial surveys conducted annually in eastern and western Canada, and parts of the United States. Additional small-scale, usually annual, breeding waterfowl surveys are also conducted in other parts of this country. Information on sea duck populations comes mainly from surveys limited to a few key locations or a small area of the species range, during the breeding, moulting, or wintering period. Goose population estimates and trends are derived mainly from specific annual or occasional surveys carried out during the breeding season or, in some cases, during migration. Additional information on waterfowl populations is also provided by mid-winter surveys on the wintering grounds conducted annually in the four U.S. flyways. Population information on swans and other migratory game birds is derived from specific breeding or wintering surveys, or countrywide breeding bird surveys. Harvest levels of migratory game birds in Canada and the United States are estimated through national harvest surveys and, in some cases, through species-specific surveys. From 1961 through 2001, estimates of waterfowl harvest in the U.S. were derived from the U.S Fish and Wildlife Service's Waterfowl Questionnaire Survey. A new survey (Harvest Information Program or HIP) was fully implemented in 1999, and in addition to waterfowl, included species and groups of migratory game birds such as woodcock, doves and snipe. Since the source of participants and the questionnaire used in the Harvest Information Program are different from those used previously, harvest estimates between the two surveys are not comparable. U.S. harvest estimates from 1999 to 2003 should be viewed as preliminary.

Population Status of Inland Ducks

Eastern Canada

In eastern Canada, breeding waterfowl populations are monitored annually through the Eastern Waterfowl Breeding Ground Survey (hereafter Eastern Waterfowl Survey). This systematic helicopter survey covers the Boreal Shield region from northeastern Ontario to Newfoundland, and the Atlantic Highlands region from the Gaspé Peninsula (Québec) to Nova Scotia (Figure 1). This survey was designed primarily to provide breeding population estimates and trends for the American Black Duck, an early-nesting species. The survey has been conducted by CWS since 1990, as part of the Black Duck Joint Venture of the North American Waterfowl Management Plan (NAWMP).

Additional breeding population surveys are also conducted in other parts of eastern Canada not covered by the Eastern Waterfowl Survey. In Prince Edward Island, an annual breeding waterfowl survey on ground plots has been in place since 1985, and is done cooperatively by CWS and the PEI Fish and Wildlife Division. In southern Ontario, a breeding waterfowl survey on ground plots has been conducted by CWS at irregular intervals since 1971, and was repeated in 2003. In 2004, surveys along the St. Lawrence River shoreline and in the lowlands of southern Québec were incorporated into the eastern waterfowl survey program in order to assess on a regular basis, the value of these areas to breeding waterfowl.

In this section, we summarize information on inland duck populations in eastern Canada. Discussion of results from the Eastern Waterfowl Survey by region can be found in Bateman and Hicks (2004) and Ross (2004) or obtained from D. Bordage (CWS, pers. comm.).

American Black Duck

There is some concern over American Black Ducks (*Anas rubripes*) populations in North America. Mid-winter inventories in the Atlantic and Mississippi flyways have shown a decline in the continental population between 1955 and the early 1980s, when numbers stabilized at a low level (Figure 2). The number of black ducks counted in both flyways in winter 2004 (227,000) was 9% lower than the previous year (249,000), and is 19% below the 1994-2003 average (280,000) (Fronczak 2004, Serie and Raftovich 2004). Survey results in the Atlantic Flyway for 2001, and in the Mississippi Flyway for 1993 and 1997, were incomplete in some states and are, therefore, not comparable with other years.

Surveys of American Black Ducks on their wintering areas are useful for studying overall population trends, but they are not very effective for evaluating the status of breeding populations, because of the mixing of populations from diverse areas. In the area covered by the Eastern Waterfowl Survey, the number of indicated breeding pairs of American Black Ducks has increased significantly ($P < 0.05$) over the 1990-2004 period (Figure 3 and Tables 1 and 2, Collins 2004). Breeding populations have increased significantly in all survey strata ($P < 0.05$; Table 2). Compared to 2003, the estimated number of indicated breeding pairs in the Entire Survey Area declined slightly (<2%) to 276,000. This decline was seen in the Atlantic Highlands and the Boreal Shield–Western survey strata (stratum 1 and 4). The reason for declines in these strata is not clear.

On Prince Edward Island, breeding waterfowl surveys show a significant increase ($P < 0.01$) in the number of indicated pairs of American Black Ducks over the 1985-2003 period (Bateman and Dibblee 2003). This suggests an increasing breeding population of black ducks on the island.

The long-term decline in the counts of American Black Ducks in mid-winter inventories is paralleled by a decline in the number of indicated breeding pairs observed during breeding waterfowl surveys in southern Ontario between 1971 and 2003 (Table 3) (North and Vanos, CWS, pers. comm.). At the same time, a significant increase in mallards suggests mallards now occupy the area previously used by black ducks. These ground-based surveys were not run in 2004; modification of this plot survey program is currently under consideration.

Additional information on the status of breeding waterfowl populations can be obtained by studying changes in the proportion of immatures to adults (age ratios) in fall populations. Age ratios of fall waterfowl populations are an index to the reproductive success of the species in the previous summer (Bellrose 1980). Figure 4 shows that age ratios of American Black Ducks in the eastern Canada harvest have fluctuated greatly. To be more meaningful, the age ratios in the harvest should be corrected for the higher vulnerability of young birds. Nonetheless, there was a gradual decline in the proportion of immature birds in the harvest until about 1990. There has been no apparent trend in age ratios since then. A new low was reached for the Atlantic Canada population in 1999 and the Québec and Ontario populations in 2000, however since that time, age ratios have generally increased across the range.

The decline of American Black Ducks on their wintering grounds prompted Canada in 1984 and the United States in 1983 to initiate a joint reduction in the harvest of black ducks. Between 1984 and 1988, the harvest in the U.S. gradually decreased, while it remained relatively the same in Canada (Table 4). In 1989 and 1990, however, Canada successfully implemented more rigid black duck hunting restrictions in order to protect local breeding populations. The average harvest is Canada over the past five years was 137,200 birds, which is less than 50% of the harvest during the five years (1979-1983) prior to the introduction of restrictive regulations. The estimated continental harvest in 2003 was 238,400 black ducks, which is the lowest value since CWS began estimating harvests in Canada in 1974 (Table 4). No doubt, at least part of the decrease in harvest over the longer term is also related to declining number of hunters. In Canada, harvest of American Black Ducks in 2003 was 20% lower than the previous year. In the U.S. the harvest decreased by more than 47,000 birds (-27%) in comparison to 2002.

Other Inland Duck Species

The Eastern Waterfowl Survey of eastern Canada, provides quantitative information on other inland duck species that can be used to evaluate the status of breeding populations. Trends in the number of indicated breeding pairs of the most abundant species are presented in Table 2 and breeding population estimates in Figure 5 (data per region are presented in Table 1). For Mallards (*Anas platyrhynchos*), Green-winged Teal (*Anas crecca*), Wood Ducks (*Aix sponsa*) and Ring-necked Ducks (*Aythya collaris*) the number of indicated breeding pairs has increased significantly ($P < 0.05$) in the entire survey area over the 1990-2004 period (Collins 2004). The breeding population of Mallards was estimated at 112,200 indicated pairs in 2004, that of Green-winged Teal at 75,800, Wood Ducks at 43,300, and Ring-necked Ducks at 177,100.

On Prince Edward Island, breeding waterfowl surveys indicate an increasing breeding population of Green-winged Teal and a stable breeding population of Ring-necked Ducks for the 1985-2003 period (Bateman and Dibblee 2003). In contrast, survey results suggest a declining breeding population of Blue-winged Teal (*Anas discors*) since 1990. Brood production indices were mixed in 2003, with very good production for ring-necked ducks, average blue-winged teal production and low production of green-winged teal. Data on less abundant species are also presented in Bateman and Dibblee (2003).

As mentioned previously, ground based breeding waterfowl surveys were not conducted in southern Ontario in 2004. Previous results of these surveys suggest a decline in the breeding population of Green-winged Teal between 1971 and the 1985-2003 period, and an increase in the breeding populations of Wood Ducks and Mallards during the same period (Table 3). No data for Blue-winged Teal are available for 1971. The number of indicated breeding pairs of Mallards and Wood Ducks did not show any particular trend between 1985 and 2003, whereas it has increased for Green-winged Teal. In contrast, the number of indicated breeding pairs of Blue-winged Teal declined during the same period, although it has remained relatively stable since the 1995 survey (Table 3).

Canadian Prairies and Western Boreal Canada

Breeding waterfowl populations are monitored annually through the Waterfowl Breeding Population and Habitat Survey (U.S. Department of the Interior and Environment Canada 1987). The traditional area of the survey encompasses the Canadian Prairies and Western Boreal Canada (northwestern Ontario to Old Crow Flats in the Yukon), as well as the north central U.S. (U.S. Prairies) and parts of Alaska (Figure 6). The U.S. Fish and Wildlife Service (USFWS) and CWS have been conducting this survey, using fixed-wing aircraft in combination with ground counts, since 1955. Breeding population estimates have been corrected for visibility bias since 1961. The southern portion of the survey area is typically covered again later in the summer to provide indices of overall waterfowl production (conducted by the USFWS, known as the July (Brood) Production Survey) however this survey was not completed in 2004 (USFWS 2004:6).

In this section, we summarize information on inland duck populations in the Canadian Prairies and Western Boreal Canada. Summaries of results by province and territory can be found in Canadian Wildlife Service, Prairie and Northern Region (2004).

Breeding Habitat Conditions in the Prairie Pothole Region

In the prairie pothole region (Canadian and U.S. Prairies; Figure. 6), weather has a strong influence on waterfowl breeding habitat conditions and, consequently, on the abundance of waterfowl populations. Drought in the late 1980s and early 1990s created particularly difficult breeding conditions for ducks. Spring habitat conditions (as measured by the number of ponds in May) improved into the late 1990s from the low levels during the drought of the late 80s and early 90s (Figure 7). Water levels have been declining again in recent years, and in spite of improvements in pond numbers in 2003, index values were 19% below the long-term average in 2004. The estimate of 3.9 million ponds in the prairie pothole region represented a decrease of 24% from 2003 (USFWS 2004). The decrease was particularly striking in the Canadian Prairies where, in spite of a significant spring blizzard on May 11, the number of ponds declined by 29% as compared to 2003 (Canadian Wildlife Service, Prairie and Northern Region 2004). The 2004 value was 27% below the 10-year average, and 15% below the long-term average. Analysis of trends showed a continued decline in pond numbers as measured over the past decade (Table 5).

Total Ducks

The total duck population for the Canadian Prairies (southern portions) in 2004 was estimated at 8.7 million ducks (Canadian Wildlife Service, Prairie and Northern Region 2004), a substantial decrease over the 13.6 million estimated in 2003. This year in Western Boreal Canada, the estimated breeding population of all ducks was 10.2 million ducks, no change from the value calculated for 2003. Table 5 shows that although the total duck population in the 52-strata traditional survey area declined over the most recent five and ten year periods, there was no trend in the long (1961-2004) term. Note that, contrary to the method of reporting used by the USFWS (2004), total ducks here include all species of ducks observed during the surveys, including sea ducks.

Mallard

The Mallard breeding population in the traditional survey area had recovered from the decline seen in the 1980s, but in 2001, for the first time in five years, it dropped below the NAWMP goal of 8.20 million (Figure 8), with a continued decline observed in 2002. There was modest recovery in 2003, with an estimated total breeding population of 7.95 million birds. In 2004, Mallard breeding population index in the traditional survey area declined by 7% to 7.43 million birds. The five- and ten-year trends show significant declines ($P < 0.05$), but there is no trend over the long term (Table 5).

Compared to 2003, the Canadian Prairie breeding population decreased by 20% in 2004 to 2.60 million birds (Canadian Wildlife Service, Prairie and Northern Region 2004), well below the NAWMP goal of 4.37 million birds for the region (Figure 8). The five- and ten-year trends show significant declines ($P < 0.05$) (Table 5). In Western Boreal

Canada, the Mallard breeding population was up slightly (5%) over the previous year, with an estimated 2.08 million birds (Figure 8). Mid- and short-term (5 and 10 year) trends, although negative, were not significant (Table 5).

The July Production Survey usually provides a measure of overall duck productivity; however, it is not possible to differentiate the brood as to species. Regardless of the utility of this index, the traditional brood survey program was not conducted in 2004. Age ratios of fall waterfowl populations can be used as an index to the reproductive success of the species in the previous summer (Bellrose 1980). Species-specific information on productivity can be obtained by studying changes in age ratios in the fall harvest of the species. Based on the harvest survey, the proportion of juveniles in the Mallard harvest remained relatively constant across the Prairie Provinces in 2003 compared to 2002 (Figure 9).

The continental harvest of Mallards during the last several years increased considerably compared to the late 1980s and early 1990s (Table 6), reflecting the large increase in the mallard population. This increase in harvest has occurred entirely in the U.S., whereas in Canada harvest levels have stabilized. In 2003, it is estimated that 5.0 million Mallards were killed in the U.S., an increase of 2% from the previous year. In 2003 in Canada the estimated harvest declined for the fourth consecutive year (by 6% over 2002 figures) to 511,500. Overall, when compared to 2002, the continental harvest of Mallards remained relatively constant (1% increase) at 5.53 million birds.

Northern Pintail

Following the dramatic decline in abundance in the 1980s, the breeding population of Northern Pintail (*Anas acuta*) in the entire traditional survey area showed signs of recovery, increasing to 3.6 million birds by 1997 (Figure 10). However, since the late 1990's pintail numbers have again been in decline. A substantial increase over the previous years numbers was noted in 2003, however the 2004 continental breeding population declined again to 2.18 million birds, a drop of 15% from the 2.56 million birds estimated in 2003. The population size continues to be far below the NAWMP population goal of 5.60 million birds (Figure 10). The status of this species is the focus of NAWMP's Northern Pintail Action Group, which hopes to identify and mitigate the key factors driving the declining trend.

During the 1970s, the Canadian Prairies supported about half of the pintails in the traditional survey area. The decline of that region's breeding population has therefore had major repercussions for the size of the continental breeding population, and has been compounded by declines in the smaller populations of the U.S. Prairies and of Western Boreal Canada (Figure 10). Long-term population declines in all three regions are significant ($P < 0.05$, Table 5), as is the long-term decline for the entire traditional survey area. The Alaska sub-population remains the only population component not demonstrating a long-term decline in Northern Pintail numbers (Table 5).

Although the breeding population of the Canadian Prairies rebounded strongly in 2003 (>300% over 2002 numbers; Figure 10) to an estimated 1.28 ± 0.15 million birds this population fell sharply again in 2004 (Canadian Wildlife Service, Prairie and Northern Region 2003). The 2004 estimate of 674,700 birds in prairie Canada remains far below the NAWMP population goal of 3.30 million. Northern Pintail numbers in Western Boreal Canada increased by 18% to 227,900 birds in 2004 (Figure 10). In spite of this increase, this population remains below the NAWMP goal of 407,000 pintails for that region.

The total annual harvest of Northern Pintails dropped with the decline in the population that began in the 1980s. The harvest gradually increased during the mid 1990's (Table 7), reflecting the increase in estimated pintail numbers during the same period. Since 1999 the estimated numbers for the breeding population and the harvest have again dropped. In 2003, the continental harvest was estimated at 389,100 birds, essentially unchanged from 2002. In the U.S., it was estimated that 341,100 pintails were harvested in 2003, an increase of 5% compared to 2002. The estimated harvest in Canada in 2003 decreased by 16% to 47,900 birds.

Other Dabbling Ducks

Other dabbling duck species monitored during the Waterfowl Breeding Population and Habitat Survey are American Wigeon [*Anas americana*], Gadwall [*A. strepera*], Green-winged Teal, Blue-winged Teal, and Northern Shoveler [*A. clypeata*]. Abundance of most of these species decreased in 2004 relative to 2003 (Figures 11 through 15) however all but American Wigeon show significant positive long-term trends (Table 5). Three species (Gadwall, Green-winged Teal, Northern Shoveler) are currently at or above the NAWMP population goals (Figures 12, 13 and 15).

In all cases there were decreases in the 2004 population estimates for the Canadian Prairies. For Green-winged Teal and Gadwall, these decreases were somewhat offset by increases observed in the Western Boreal Canada and U.S. Prairie regions.

American Wigeon continues to show significant declining trends in the Canadian Prairies in the short, medium and long term periods (Table 5). The Canadian Prairies population of American Wigeon has not recovered to the levels seen in the 70s and at 248,100 birds remains far below the NAWMP goal of 1.16 million for the region.

Scaup

Lesser Scaup (*Aythya affinis*) and Greater Scaup (*A. marila*) are not differentiated during the Waterfowl Breeding Population and Habitat Survey, as it is difficult to distinguish between the two species from fixed-winged aircraft. However, Lesser Scaup are the much more abundant species (Austin *et al.* 1999). Scaup breeding populations are in decline in the traditional survey area (Figure 16) with significant ($P < 0.05$) declines in breeding numbers observed over the long term (Table 5). After several years of declines, the scaup population increased for the second consecutive year in 2004 (by 2% over 2003 estimates to 3.81 million birds) but remained well below the NAWMP goal of 6.30 million. The population in Western Boreal Canada of Greater and Lesser Scaup accounts for more than half of the continental total. The declining trend for the entire traditional survey area is largely a result of significant declines in that Western Boreal region's breeding population ($P < 0.05$) (Figure 16; Table 5). At 2.24 million birds estimated in 2004, the number of scaup in Western Boreal Canada remains well below the NAWMP population goal of 4.3 million birds. The Canadian Prairies scaup breeding population show significant ten and five-year declines ($P < 0.05$) (Figure 16, Table 5). This population also remains well below the NAWMP goal of 1.05 million. In 2004, the Canadian Prairie breeding population was estimated at 340,300 a decrease of 28% over previous year's estimate (Canadian Wildlife Service, Prairie and Northern Region 2004).

Reasons for the decline of Scaup breeding populations are not known. Concerns over the abundance of scaup populations prompted the U.S. Geological Survey's Northern Prairie Wildlife Research Center to host a workshop (Austin *et al.* 1999) in September 1998, to provide biologists the opportunity to share information and to discuss research needs and opportunities for collaboration. Recent research suggests possible explanations for declining abundance of Lesser Scaup could include compromised reproductive output due to the accumulation of selenium on the lower Great Lakes (Petrie 2004). A second explanation currently under investigation is a long-term decline in resource quality or availability which may lead to poorer female body condition on arrival at breeding areas (Anteau and Afton 2004).

Harvest of Lesser and Greater Scaup has declined considerably in Canada over the years (Tables 8 and 9), possibly reflecting the decline of scaup populations. In 2003, Canadian harvest of Lesser and Greater Scaup was estimated at 31,100 and 9,600 birds, respectively, which in both cases represents an decrease over 2002 (-6% and -17% respectively). Scaup harvest has been quite variable in the U.S. (Tables 8 and 9). Harvest of Lesser Scaup declined sharply in the late 1980s and early 1990s, but increased considerably from 1994 to 1998. The 2003 Lesser Scaup harvest in the U.S. of 289,600 birds was a decrease of 24% compared to 2002. Greater Scaup harvest also declined over the years in the U.S. (excepting a substantial increase in 2002), once again showed a decrease in 2003. The estimated harvest in 2003 was 49,200 birds, relatively consistent with the average harvest estimate of 46,200 since 1999. The continental harvest of Lesser Scaup decreased by 22% to 422,000 for the year 2003 and fell by 29% for Greater Scaup to 58,700.

Except for Lesser Scaup harvested in the U.S., harvest pressure on the two species has generally decreased in Canada and the United States. When breeding populations of scaup were relatively large (1975-1979), the mean harvest rate index (harvest/breeding population size) in Canada for Lesser Scaup was slightly more than 2%, and for Greater Scaup approximately 7%. In 2003, the harvest rate indices for both species were just slightly above 1%. In the U.S., the mean harvest rate index for Lesser Scaup in the late 70s was about 7 - 8%, but in 2003 had increased to about 11%. In contrast, the harvest rate index for Greater Scaup declined from about 10% in the late 70s to just over 5% in 2003.

Other Diving Ducks

The other diving duck species monitored during the Waterfowl Breeding Population and Habitat Survey are the Canvasback [*Aythya valisineria*], Redhead [*A. americana*] Ring-necked Duck, and Ruddy Duck [*Oxyura jamaicensis*].

Other than a significant increase in Alaska, the Canvasback shows no other statistically significant trend in any strata of the traditional survey area over the long term (Table 5, Figure 17). The entire survey area showed a significant decline over the recent ten-year period, reflecting a parallel decline in the Canadian and U.S. Prairie populations since the late 1990s, but at 617,200 remains above NAWMP goal (Table 5; Figure 17). The breeding population of Canvasbacks in the Canadian Prairies had recovered somewhat from the population decline seen during the 1980s and early 1990s, but at 241,100 birds, is again below the NAWMP goal of 335,000 ducks in 2004. This is a decrease (-21%) compared to last year's estimate and 29% below the ten-year average and 21% below the long-term average (Canadian Wildlife Service, Prairie and Northern Region 2004). Declines observed on the Canadian Prairies are in part offset by increases in all other strata within the traditionally surveyed area. This pattern of shifting distribution can also be seen with the Canadian Prairie and Alaskan populations of Redheads (Figure 18). Both of these population subcomponents declined in 2003 over estimates from 2002 however this was compensated for by increases observed on the U.S. Prairies and the Canadian Boreal strata. Trends for redhead populations show significant ($P < 0.05$) declines over the five and ten year periods but significant increases over the longer term (Table 5). Redhead populations are slightly below the NAWMP goal for the Canadian Prairies, but above goal populations in the Canadian Boreal region. Irrespective of recent trends and the possible effects of redistribution within the surveyed area, redhead populations remain only slightly below (-5%) the NAWMP population goal for the entire survey area (Figure 18).

The Ring-necked Duck population for the entire survey area showed a significant increase for the ten-year and long-term periods for the Entire Survey Area (Table 5; Figure 19). The significant trends ($P < 0.05$) over the long term for the Ruddy Duck include increases in the Western Boreal, Canadian Prairie and U.S. Prairies strata, and for the entire survey area (Table 5; Figure 20).

Southern Yukon

The southern Yukon is surveyed through the Cooperative Roadside Waterfowl Breeding Population Survey (Hawkings and Hughes 2004). This year was the fourteenth year of this cooperative waterfowl survey. A total of 179 wetlands were surveyed at least once along the road system in the southern Yukon. Of these, 165 were surveyed five times during the same five-week period in both 2003 and 2004. April was a little warmer and much drier in the southern Yukon. May temperatures continued to be above normal, and precipitation was generally below normal, except in the southwest where normal rainfall occurred. June was a record-breaking warm month.

In 2004, total number and indicated breeding pairs of all waterfowl (ducks, geese, swans, loons and grebes) increased by 26% (to 1,335 birds) and 7% (to 569 pairs), respectively compared to 2003 values. The total number of dabbling ducks decreased by 49% and indicated pairs of dabblers increased by 18%. There was an increase of 10% in the total number of diving ducks, while indicated pairs of divers decreased by 5% (Hawkings and Hughes 2004). Indicated breeding pairs of dabblers and divers are now at 77% and 52% of 1991 levels, respectively. Breeding pairs of most common dabbling and diving duck species increased from 2003 to 2004 (Figures 21 and 22), continuing similar trends seen in 2002 and 2003 (Hawkings and Hughes 2003). Note that data presented in Figures 21 and 22 are scaled to a constant value for 1991, and represent departures from this constant and not an absolute density.

There were notable increases in Northern Shoveler (+142%), Northern Pintail (+82%), Green-winged Teal (+49%) and American Wigeon (+31%). Decreases were seen in Horned Grebe (-13%) and Scaup (-5%) (Hawkings and Hughes 2004).

Interior British Columbia

Breeding waterfowl populations in the interior of British Columbia have been monitored since 1987 through a roadside survey conducted cooperatively by CWS and several partners (A. Breault, CWS, pers. comm.). One of the objectives of this survey is to assess trends in the abundance of breeding waterfowl on a large number of wetlands in interior B.C. Approximately 290 wetlands have been monitored fairly consistently since 1988, allowing for long-term comparisons of waterfowl abundance over a fixed amount of habitat.

Spring 2004 breeding habitat conditions were among the worst encountered since surveys were initiated. The winter of 2003/2004 was characterized by mild temperatures and lower than average precipitation in the latter part of the winter throughout southern British Columbia. Gradual thawing of the snow pack resulted in reduced surface runoff and May water levels at low elevation wetlands were the lowest ever recorded in the course of this survey program. Dabbling duck counts (breeding pairs and total birds) were well below average for the second year in a row while diving ducks (breeding pairs and total birds) dipped below long-term average values. These numbers likely represent the effects of the loss of shallow and seasonal wetlands used primarily by dabbling ducks.

The total number of dabbling duck pairs was 15% lower than in 2003 and 38% below the long-term average. Among dabbler species, Blue-winged and Cinnamon Teal, Northern Pintail and Wood Duck increased relative to 2003. All other dabbling duck species showed declines over numbers recorded in the previous year. Breeding pair numbers are quite variable over the period covered by the survey (Figure 23). In 2004 only Gadwall pair counts were above their long-term average (+17%) with pair counts below the long term average for all other common dabbling duck species. (A. Breault, CWS, pers. comm.).

Fewer diving ducks were also observed in 2004 compared to 2003 (-23%), with the 2004 index 8% below the long term average. The number of diving duck breeding pairs was down by 8% compared to 2003, and 5% below the long-term average (Figure 24). Compared to last year, the number of breeding pairs of Redhead and Scaup increased (12 and 17% respectively) with all other species showing declines over 2003 index values. Compared to the long-term averages, only breeding pair numbers of Bufflehead (+7%) and scaup (+17%) remain above the long-term average. Frequently encountered species showing declines in breeding pair numbers relative to long-term average values were Barrow's Goldeneye (-9%), Canvasback (-44%), Common Goldeneye (-44%), Hooded Merganser (-67%) Redhead (-14%), and Ring-necked Duck (-43%) (A. Breault, CWS, pers. comm.).

In interpreting the results of this survey it should be kept in mind that most of the wetlands are semi-permanent or permanent ponds. This means waterfowl abundance is often underestimated in wet years (as waterfowl redistribute to the small and temporary wetlands that have become available), while estimates will be more accurate in dry years (when most remaining wetlands are semi-permanent or permanent water bodies). Survey timing is meant to capture the peak nesting period for most species but the mild winter observed in 2003/2004 may have resulted in earlier nesting for some species, which in turn may have led to a lower count of both total birds and breeding pairs.

In 1999, CWS and the Pacific Flyway Council initiated an additional waterfowl survey to assess the abundance of waterfowl, and in particular mallards, breeding in British Columbia. The survey design uses a Geographical Information System (GIS) and takes into account the distribution and availability of wetlands in various ecological units of the province. In order to estimate the waterfowl value of wetlands of different sizes, breeding waterfowl surveys are referenced and compiled by wetland size and ecological unit (eco-sections), as indicated by the B.C. Watershed Atlas (a digital compendium of aquatic features in the province). The GIS was used to determine the coverage of the random transects with respect to percentage of wetland area intercepted and coverage of wetlands of various size classes. Over half of the wetlands cover an area of less than one hectare. There are still many gaps in quantifying the value of different wetlands and different habitats; but this survey has led to a preliminary estimate of over 750,000 pairs of breeding waterfowl in the province. In 2003 the surveys were extended into three new ecological units; Chilcotin Upland, Chilcotin Plateau and Liard Plains ecosections. Over the last 5 years, helicopter surveys have been conducted in 14 of the 115 ecosections found in the province. Preliminary analyses indicate that those ecosections alone support well over 60,000 breeding pairs of Mallards. This survey will fill important gaps in the population assessment and monitoring programs of both CWS and the Pacific Flyway Council, and will improve our understanding of waterfowl abundance and species composition in BC (A. Breault, CWS, pers. comm.).

Population Status of Sea Ducks

There is concern about the population status of most of the sea duck species (tribe *Mergini*) that breed in North America. Because many breed at low densities in remote parts of the continent and cover a broad geographic area, it is difficult to gather adequate information on their ecology and population dynamics. Consequently, sea ducks are poorly known and few reliable population indices or estimates of annual productivity exist for any of the species. Harvest levels are also poorly known. In comparison to other waterfowl, sea ducks have low reproductive rates, which means that population maintenance is highly sensitive to adult mortality. Therefore, there is limited potential for quick population recovery. Because of the increasing concern about the status of sea ducks, the NAWMP Committee created the Sea Duck Joint Venture in 1998 (http://www.seaduckjv.org/).

Traditional mid-winter surveys are only conducted in the U.S. portion of the Atlantic and they do not cover off-shore areas where sea ducks winter. Consequently they do not provide a comprehensive index to overall abundance. Despite the limitations of mid-winter surveys in monitoring sea ducks, these surveys can still provide long-term data for some sea duck species for a broad geographic area. Kehoe (1996) examined trends in eastern sea duck populations using the traditional mid-winter surveys. In part to address deficiencies in the traditional mid-winter inventory, the USFWS initiated an aerial transect survey to provide wintering distribution and relative density information for sea ducks along the Atlantic Coast in 1991 (Goldsberry 1997). The Atlantic Coast Sea Duck Survey is conducted in late January or early February from Chedabucto Bay, Nova Scotia, south to the Georgia-Florida state line. To date, ten years of data have been collected. Although surveys were not conducted in 2003 or 2004, there remains interest in maintaining this survey program (J. Wortham, USWFS, pers. comm.).

Harvest information is estimated through the traditional harvest surveys in Canada and the United States. Harvest estimates are imprecise for many species due to small sample sizes. In addition, a special sea duck harvest survey in Newfoundland and Labrador for eiders, scoters, and Long-tailed

Duck has been conducted by CWS over the last four hunting seasons. This special survey was designed to try to overcome limitations of the National Harvest Survey, notably the lack of coverage for late season harvest.

Eiders

There is little information on the population dynamics and ecology of Arctic-breeding eiders. Considerable concern exists over the status of eiders breeding in the Arctic, where these birds are hunted throughout their range (G. Gilchrist, CWS, pers. comm.). Reviews by Suydam (2000), Gilchrist and Dickson (1999), and Dickson (1996, 1997) provide useful summaries of what is known about eider species that breed in Canada – the King Eider (*Somateria spectabilis*) and Common Eider (*S. mollissima*). King Eiders breeding in the Canadian Arctic winter both east and west of the continent. Since King Eiders form pairs on the wintering areas, there may be two distinct populations, although genetic differences have not been identified to date (L. Dickson, CWS, pers. comm.). For Common Eiders breeding in northern Canada, three subspecies are recognized: the Pacific subspecies *v-nigra* (western and central Arctic), the northern subspecies *borealis* (eastern Arctic), and the Hudson Bay subspecies *sedentaria* (Hudson Bay and James Bay). A fourth race, the American subspecies *dresseri*, breeds in Atlantic Canada.

King Eider

Western Arctic Population

There is growing evidence that the western Arctic population of King Eiders has declined considerably in the last few decades. Spring counts of eiders migrating past Point Barrow, Alaska, indicate that the King Eiders breeding on the Arctic coastal plain of Alaska and in the western and central Canadian Arctic declined by more than 50% between 1976 (count of 800,000 birds) and 1996 (350,000) (Suydam 2000). Aerial surveys conducted in the western Canadian Arctic in 1991-1994, together with the work by Alisauskas (1992) in the Queen Maud Gulf, have provided a breeding population estimate of about 200,000 to 260,000 King Eiders in the western and central Canadian Arctic (Dickson *et al.* 1997). This estimate is considerably lower than the estimate of 900,000 of Barry (1960) 40 years ago, which suggests a substantial decline in abundance of the western Arctic population (Dickson *et al.* 1997). Reasons for the decline are unknown. Surveys for King Eiders and other waterfowl are currently underway in the central and western Arctic to ascertain current population size and determine trends (L. Dickson, CWS, pers. comm.).

Movement between nesting, moulting and wintering areas has been documented for 42 King Eiders tagged with satellite transmitters on Victoria Island and Banks Island, NWT, and Prudhoe Bay, Alaska. The results show the majority of western King Eiders moult and winter off the east coast of Russia (L. Dickson, CWS, pers. comm.). King eiders banded in the central arctic, in the Queen Maud Gulf, have been recovered near Alaska as well as near Greenland (R. Alisauskas, CWS, pers. comm.).

Nearly all (99%) of the harvest of western Arctic eiders within Canada occurs near the community of Holman on western Victoria Island, NWT (Fabijan *et al.* 1997). A three-year study was conducted at Holman to further our understanding of the impact of the Holman subsistence harvest on that area's eider subpopulations. Holman hunters harvested an estimated 4 to 7% of the King Eider subpopulation and less than 1% of the Common Eider subpopulation available to the community. The present levels of harvest at Holman are likely sustainable. However, more information on recruitment rates and mortality, including harvest in Russia, is needed to confirm this (L. Dickson, CWS, pers. comm.).

Eastern Arctic Population

A review of available data on the wintering grounds in Greenland has shown a substantial decrease in the numbers of wintering and moulting King Eiders and suggests that the eastern Arctic population is declining. It is not known if this apparent decline represents a shift in distribution due to human disturbance (Suydam 2000). In the Rasmussen Lowlands (Nunavut) however, a significant decline in the numbers of King Eiders was seen between 1974-1975 and 1994-1995 (Gratto-Trevor *et al.* 1998), which supports the concerns expressed by hunters in the area that numbers are declining (Johnston *et al.* 2000).

In the eastern Arctic, available harvest data for eiders is limited. However, the harvest of eiders (King and Common eiders combined) in southwest Greenland is estimated at over 100,000 birds annually. A large proportion of this harvest consists of Canadian breeders, since the breeding population of Common Eiders in west Greenland is likely only 20,000 pairs based upon recent surveys (G. Gilchrist, CWS, pers. comm.).

Pacific Common Eider

There is evidence based on migration counts at Point Barrow that the population of Pacific Common Eider has declined considerably in recent years. Counts during spring migration show a decline of more than 50% between 1976 and 1996 (Suydam *et al.* 2000). Reasons for the decline are unknown. A study in Bathurst Inlet of the reproductive ecology and survival of Pacific Common Eider, including identification of the factors affecting productivity and survival, was initiated in 2001 to determine if conditions on the breeding grounds are contributing to the recent declines (L. Dickson, CWS, pers. comm.).

Surveys during spring migration in the late 1980's suggested that more than 80% of the Pacific Common Eiders that breed in Canada nest in Dolphin and Union Strait, Coronation Gulf, and Queen Maud Gulf. To document the size and location of nesting colonies, provide a breeding population estimate for the region, and establish a baseline for monitoring Pacific Common Eider populations in future, aerial and ground surveys were conducted over three years beginning in 1995. The breeding population for the central Arctic was estimated at about 37,000 and the primary nesting areas were identified as southeastern Dolphin and Union Strait, outer Bathurst Inlet, Melville Sound, Elu Inlet and central Queen Maud Gulf (L. Dickson, CWS, pers. comm.).

Satellite telemetry of 47 eiders from a nesting colony near Bathurst Inlet, Nunavut indicated these eiders winter off the southeast coast of Chukotka Peninsula, Russia (L. Dickson, CWS, pers. comm.). About one-third of the males also moult off Russia. Harvest information for eastern Russia is limited, but suggests a substantial take of eiders. A rough estimate of the subsistence harvest in 2001 in Chukotka was 115,000 eiders (includes 4 species) (E. Syroechkovski, Jr, pers. comm.). However, it is unknown what percentage of this take is Pacific Common Eiders from Canadian breeding grounds. Subsistence harvest of Pacific Common Eiders in Canada and Alaska is an estimated 2,500 birds per year (Fabijan *et al.* 1997).

Northern Common Eider

The northern subspecies of the Common Eider breeds throughout the coastal areas of the eastern Canadian Arctic and Greenland, and winters along the coasts of Labrador, Newfoundland and southwest Greenland. This race of eider is subjected to heavy subsistence and sport harvest throughout its breeding, staging, and wintering grounds, especially in Greenland (see harvest section below) (F. Merkel, Greenland Institute of Nature, pers. comm.). Reliable data on population status does not exist and few key habitat sites have been identified; historical data only exists for three sites, Ungava Bay, Hells Gate (high Arctic), and Digges Sound. Recent surveys in Greenland indicate that dramatic population declines have occurred since the 1970s.

Historical data exists for the colonies in Ungava Bay (Chapdelaine *et al.* 1986) and repeated surveys conducted in 2000 provided the first meaningful population trend data for Northern Common Eiders in Canada. Preliminary results indicated an increase in the number of eiders for three archipelagos and a decrease in the most northern archipelago compared to the early 1980s (Falardeau *et al.* 2003). The small Northern Common Eider colonies in Digges Sound (located off the northwest tip of Québec) were resurveyed in 1999. The survey did not show any significant population trend since the early 1980s (Hipfner *et al.* 2002.).

These field studies showed that annual variation in colony attendance of Common Eider ducks (e.g. low attendance due to heavy ice conditions) make the interpretation of survey data difficult. Long term annual monitoring of a subset of colonies would be useful to quantify this variation (J-P Savard, CWS, pers. comm.).

Surveys of the Digges Island colonies in 2004 revealed a number of dead Common Eiders (T. Gaston, unpubl. CWS rep.). Analysis confirmed the presence of Avian cholera in samples submitted for necropsy. Although the long-term trend in the breeding population of Northern Common Eider in the Digges Island archipelago is difficult to assess, the impact of Avian cholera in 2004 was potentially quite severe given the extent of the outbreak and the relatively small size of the local breeding population. Avian cholera was also reported for several small islands in northwestern Ungava Bay (P. May, Nunavik Research Centre, Kuujjuaq, QC).

A recent review of the band recovery data of Common Eider banded in the eastern Canadian Arctic and west Greenland showed links between breeding populations and their affinities to specific wintering areas in Greenland and maritime Canada. The majority of bands recovered from eiders banded on Southampton Island, Nunavut since 1996 have been recovered in west Greenland during winter (G. Gilchrist, CWS, pers. comm.). Recent satellite telemetry of eiders during both spring and fall migration also clearly demonstrate that large proportions of the Canadian breeding population winter in west Greenland (A. Mosbech, Danish Department of Environment and G. Gilchrist, CWS, pers. comm.).

Collectively, these findings show that the majority of Northern Common Eiders winter in southwest Greenland rather than in Canada, as was previously thought. These recent findings have important management implications because they confirm that the majority of eiders harvested in Greenland during winter are part of the breeding population in Canada. Population and harvest data of the northern common eider have been integrated in a simulation model (Gilliland *et al. submitted*), and results suggested that the Greenland harvest of northern eiders was not sustainable, while the total Canadian harvest appears to be sustainable at current levels. In response, an International Eider Conservation and Management Plan was drafted by Canada and Greenland (Gilchrist *et al.* 2002.).

Earlier estimates suggested approximately 80,000 Northern Eiders winter in the Gulf of St. Lawrence (Bordage *et al.* 1998). Numbers wintering in Newfoundland seem to have decreased through the 1980s and early 1990s but baseline surveys are lacking (S. Gilliland, CWS, pers. comm.). The entire wintering range of Northern Eider in eastern Canada (and St. Pierre and Miquelon) was surveyed from fixed-wing aircraft in 2003. This represents the first time complete survey coverage has been undertaken in the region. Data analysis is not completed yet but preliminary results suggest a minimum of 91,000 and 119,000 birds over-wintered in Québec and Newfoundland, respectively (S. Gilliland, D. Bordage and C. Lepage, CWS, pers. comm.).

Although it is understood that some exploitation does occur, accurate estimates of winter and spring harvest on the north shore of the St. Lawrence are largely unknown. Inuit in Nunavut and Nunavik harvest adults in spring, summer and fall, as well as eggs and down in summer. Inuit and non-aboriginal people commercially harvest adults in winter in Greenland. Innu and non-aboriginal people harvest adults in spring and winter in the Gulf of St. Lawrence. Understanding the dynamics of Northern Eider populations in the absence of complete information on harvest is somewhat problematic; efforts are currently underway to address this issue.

Hudson Bay Common Eider

The Hudson Bay subspecies of the Common Eider breeds within Hudson Bay and winters in open water leads near the Belcher Islands and off the west coast of Québec. This is one of the only waterfowl species in the world that spends the entire year in Arctic waters. Mass die-offs can occur in winter when large proportions of the population are concentrated in open water leads that sometimes freeze (Robertson and Gilchrist 1998). The frequency and magnitude of these die-offs and the impact that they have on the Hudson Bay eider population is unknown.

Breeding data for this subspecies only exists for a couple of locations; the Belcher Islands and in the area of LaPerouse Bay, MB. The Belcher Islands, first surveyed in the 1980s, were resurveyed in 1997. Results showed that the breeding population had declined by 70% since the late 1980s, apparently due to a winterkill in 1992 (Robertson and Gilchrist 1998). The Canadian Wildlife Service initiated research of the winter ecology of Hudson Bay common eiders in 1998. The following three winters were moderate, with large expanses of open ocean available to foraging flocks. There have been no significant winterkill events since this work began, and the eider population appears to be recovering.

American Common Eider

American Common Eiders are the most abundant species of sea duck breeding along the East Coast of North America. Their nests are exploited for down in the St. Lawrence estuary and birds are hunted across parts of the breeding and wintering ranges. R. Milton (NSDNR, unpubl.) reviewed information about the American subspecies of Common Eider. Based on surveys conducted in the last two decades, breeding populations were estimated at approximately 18,000 pairs in Labrador, 3,000 in Newfoundland, 26,000 in the Gulf of St. Lawrence and St. Lawrence Estuary, and 18,000 to 22,000 in Nova Scotia and New Brunswick. More recent information from CWS, Québec Region indicated 32,000 in the St. Lawrence Estuary and 10,000 in the Gulf of St. Lawrence (Joint Working Group on the Management of the Common Eider 2004). Numbers of eiders breeding in northern Newfoundland have been increasing between 9-12% per year throughout the 1990s (S. Gilliland, CWS, unpubl.). There are also a significant number of eiders wintering on the islands of St. Pierre and Miquelon, and the numbers have increased over the seven years of surveys, from about 2,000 birds in 1994 to at least 12,000 birds in 2003 (B. Letournel, ONCFS, St-Pierre et Miquelon, pers. comm.). A management plan was recently produced for the eiders of the St. Lawrence estuary (Joint Working Group on the Management of the Common Eider 2004; http://www.qc.ec.gc.ca/faune/faune/html/PlanEiderComplet/eider_plan.htm).

In June of 2002, CWS reported a large number of dead Common Eiders in the islands of the St. Lawrence Estuary between Rivière-du-Loup and Rimouski, Québec. The dead birds were found during down harvest in the breeding colonies. The exact count is unknown, but at least 5,400 birds succumbed (J. Rodrigue, CWS, pers. comm.) approximately 80% of which were breeding females. Analysis confirmed Avian cholera to be the cause. There have been three previous events of Common Eider mass mortality in the Estuary: 1985, 1964-66 and 1947-48. Although the breeding population of Common Eiders in the St. Lawrence Estuary appears to be stable or increasing, the impact of the 2002 Avian cholera event was severe. Observation during the laying period in May 2003 suggested that Avian cholera did not occur in the islands devastated in 2002. Preliminary reports from estimates of down harvest show no significant decrease of breeding females in the most important colonies of St.

Lawrence estuary (CWS-QC unpubl.).

Harvest in Canada over the past five years (1999-2003) averaged 15,200 birds. The average number of eiders harvested in Québec is estimated at 2,700 birds annually, while the average Nova Scotia harvest was estimated at 4,300 birds over the same time frame. The largest harvest of Common Eiders in Canada takes place in Newfoundland, where the average over the same period was 7,800 birds (Gobeil and Collins 2004). Harvest of Common Eiders in the Atlantic Flyway over the past three years (2001-2003) averaged 31,100 birds, with Maine and Massachusetts reporting the bulk (>90%) of the U.S. harvest (Serie and Raftovich 2004). In the past two years concerted banding efforts have been undertaken in the St. Lawrence estuary, in Newfoundland and Labrador as well as in Maine to obtain a better estimate of harvest and adult survival.

Harlequin Duck

Until recently, there was little knowledge of the ecology of Harlequin Ducks (*Histrionicus histrionicus*) in North America. However, research efforts are now being made to understand the life history, population status and movements of many harlequin populations on both coasts (Robertson and Goudie 1999). Robertson and Goudie (1999) provide a review of available information on the Harlequin Duck.

Eastern Population

The eastern North American population of the Harlequin Duck was listed as endangered in Canada in 1990. As a consequence, hunting of this species was closed throughout the Atlantic Flyway. In the late 1980s, the population wintering in eastern North America was estimated at less than 1,000 individuals (Goudie 1991). Over-hunting, disturbance, and habitat loss are believed to have played a role in the decline of the eastern population of Harlequin Ducks (Robertson and Goudie 1999). As a result of new information which indicated the number of birds breeding in eastern Canada to be significantly larger than suspected, the status of the eastern population was downgraded to a population of Special Concern (Thomas and Robert 2001).

Recent satellite telemetry studies suggested the existence of two Harlequin Duck populations: one which breeds in northern Québec and Labrador and winters in southwest Greenland, and one which breeds in southern Labrador, Newfoundland, New Brunswick, and the Gaspé Peninsula, and winters mostly in Maine (Brodeur *et al.* 2002). Genetic studies support the existence of two populations with minimal gene flow (Scribner *et al.* 2000). The extent to which these populations overlap on their breeding and wintering areas is unknown. The size of the harlequin population wintering in Greenland that originates in Canada is not known, but 6,200 moulting harlequins were estimated along the western coast of Greenland during surveys in 1999 (Boertmann *in press*). The population of Harlequin Ducks wintering in eastern North America has been increasing in recent years and is now estimated at about 1,800 birds, with most (~1,000) wintering in Maine at a single location (Robertson and Goudie 1999, Thomas and Robert 2001). Smaller numbers winter in Atlantic Canada. Counts of Harlequin Ducks wintering in Newfoundland showed small increases in 1996 and again in 1997. This was encouraging given the dramatic decline that occurred there through the 1980's and early 1990's.

An aerial survey in May 2000 of 30 rivers of the Québec North Shore and Labrador (rivers draining into the Gulf of St. Lawrence) discovered the first evidence of harlequins breeding on the Québec North Shore. At least 32 Harlequin Ducks, on five rivers in Québec and two rivers in Labrador, were observed. All harlequins were seen in pairs and found in potential breeding habitats, and were therefore considered as breeding individuals (M. Robert, CWS, pers. comm.). An estimated 286 Harlequin Ducks bred in the north peninsula of Newfoundland. This represents at least 20% of the eastern North American breeding population and highlights the importance of the North Peninsula as a breeding area for this population (S. Gilliland, CWS, pers. comm.). There is also evidence of harlequins breeding in southeastern Newfoundland at Bay du Nord River (S. Gilliland, CWS, pers. comm.). In addition, there is evidence of Harlequin Ducks breeding on Baffin Island, Nunavut (Mallory *et al.* 2004). A publication summarizing the status of the eastern population of Harlequin Duck is in the final editing stages and should be available shortly (Robertson and Thomas, *in press*).

Western Population

Reflecting conservation concern for Harlequin Ducks, considerable attention has focused on western populations, particularly in the Strait of Georgia, over the past decade (S. Boyd, CWS and D. Esler, SFU, pers. comm.). These efforts by Canadian Wildlife Service and Simon Fraser University collaborators have revealed much about the ecology and conservation of Harlequin Ducks; in fact, Harlequin Ducks in the Strait of Georgia are frequently highlighted as a sea duck for which we have an unprecedented understanding of ecology and demography. In brief, recent findings include: (1) the Strait of Georgia provides non-breeding habitat for > 10,000 Harlequin Ducks, (2) concentrations of Harlequin Ducks in the Strait of Georgia during herring spawn in the spring number in the thousands, which is a globally unique aggregation, (3) Harlequin Ducks wintering in British Columbia breed across a wide range of mountain streams throughout the province and beyond, (4) Harlequin Ducks show very strong fidelity to wintering and moulting sites, which may make local aggregations demographically discrete and vulnerable to local habitat change, (5) at least some young Harlequin Ducks follow their mothers to wintering areas, further contributing to formation of distinct, independent population segments, (6) annual survival of adults is high and sustainable, and (7) production of young birds appears to be insufficient to maintain stable population numbers (S. Boyd, CWS and D. Esler, SFU, pers. comm.).

Focused studies of Harlequin Ducks in the Strait of Georgia are coming to a close. Continuing and future work will focus on the important results derived from previous studies. Surveys of productivity, based on counts of male age ratios during winter, will be continued to document annual variation and derive long-term means. Also, a research program was initiated by the Centre for Wildlife Ecology, Simon Fraser University to evaluate factors that might explain the insufficient recruitment observed over the past decade. This study, conducted in the Coast Mountains of BC, will evaluate the roles of habitat quality, acquisition of nutrients for clutch formation, and interactions with insect-eating fish as potential mechanisms that could lead to broad-scale, long-term reductions in Harlequin Duck productivity (S. Boyd, CWS and D. Esler, SFU, pers. comm.).

Scoters

The three species of scoters that breed in Canada are Black Scoters (*Melanitta nigra*), Surf Scoters (*M. perspicillata*), and White-winged Scoters (*M. fusca*). Almost all Black Scoters breeding in Canada belong to the eastern population whose breeding ground is centered in northern Québec. Western Black Scoters have a breeding ground centered in Alaska (Bordage and Savard 1995). Less is known of scoters than any other group of sea ducks. Research efforts in recent years have brought us to a better understanding of the breeding, moulting, and wintering ecology of this group. Bordage and Savard (1995), Brown and Fredrickson (1997), and Savard *et al.* (1998) all provide useful reviews of the information available on scoters.

Based on traditional spring waterfowl breeding surveys, scoters as a group seem to have declined in North America over the long term (Savard *et al.* 1998). The traditional survey area of the Waterfowl Breeding Population and Habitat Survey (Figure 6) covers a large part of the breeding area of White-winged Scoters, and a good part of the Surf Scoter range. The three species of scoter are not however, differentiated during these surveys, as it is difficult to discriminate among them from fixed-winged aircraft. Based on the extent of known breeding distributions, scoter populations in the Canadian Prairies should be White-winged Scoters only, while populations in Western Boreal Canada include White-winged and Surf Scoters. All three species are present in Alaska. However, these data should be interpreted with caution, as the surveys are not well adapted for estimating scoter numbers (Savard *et al.* 1998).

Some short-term data is available for the individual scoter species. Results from the Atlantic Coast Sea Duck Survey do not show any clear trend in White-winged Scoters wintering along the Atlantic coast over the last ten years however there is considerable variation between years (Table 11). On the other hand, numbers of Black and Surf Scoters wintering along the Atlantic coast were increasing in the late 1990's, but have since levelled off.

The Dalhousie area of New Brunswick has long been thought to be a major spring staging area for scoters. During the spring of 2000, counts were made along the Restigouche River estuary. Spring staging numbers peaked at 95,000, with 80 to 85% of them being Black Scoter and 15 to 20% Surf Scoter. The counts are considered to be conservative (M. Lushington, J. Clifford, and P. Hicklin, CWS, unpubl.).

In Eastern Canada, in mid-May of 1998, surveys in the St. Lawrence Estuary and Gulf yielded over 200,000 scoters (mostly Black and Surf Scoters). Recent surveys in September and October indicated that the St. Lawrence estuary was an important fall staging area for Surf Scoters as nearly 80,000 birds were counted there (J.-P.L Savard, CWS, pers. comm.). Moult surveys in late July and early August of that year indicated that around 50,000 scoters (mostly male Surf and White-winged Scoters) moulted within the St. Lawrence Estuary (J.-P. Savard, CWS, pers. comm.). Also, between 50,000 and 62,000 moulting scoters (mostly male Surf Scoters) were located along the Labrador coast in 1998 and 1999 (S. Gilliland, CWS, pers. comm.). Thousands of black scoters moult in James Bay (Ross 1994; Bordage and Savard 1995).

Although found at very low densities on the Canadian Prairies, scoter numbers have declined over the long term based on the results of the Waterfowl Breeding Population and Habitat Survey (Figure 25 and Table 12). Scoter numbers have also declined over the long term in Western Boreal Canada (Table 12). However, for the second consecutive year, 2004 saw an increase in the population estimate. Surveys in 2004 indicated an estimated 878,000 individuals, 9% higher than in 2003, and 32% higher than 2002 values (Figure 25).

In Alaska estimated numbers decreased by 5% over 2003 to 306,600 birds however the overall the scoter population index increased by 5% over the 2003 index to 1.19 million birds.

More detailed examination of trends in various strata showed intriguing results. Alisauskas *et al.* (*in press* - a) showed that, contrary to the overall declining trend, scoters increased over the past decade in northern Manitoba and Saskatchewan, but continued to decline in northern Alberta and the Northwest Territories. Their research, making use of reverse-time capture histories of White-winged Scoters at Redberry Lake, Saskatchewan shows the long term decline of the local population has now been arrested. Interestingly, this occurred as a result of increased recruitment through immigration of adult females (Alisauskas *et al. in press - a*).

Important concentrations of Surf Scoters and White-winged Scoters are found in Coastal British Columbia in habitats that also support shellfish aquaculture, an industry that has the potential to expand dramatically. Simon Fraser University and CWS are conducting a study of the interactions between scoter populations and the shellfish industry with the intent of evaluating potential effects, either detrimental or beneficial, of shellfish aquaculture on scoter population sustainability, at local and regional scales over different time frames (S. Boyd, CWS and D. Esler, SFU, pers. comm.). A number of other research studies have also been recently completed or are currently underway. (S. Iverson, SFU and A. Breault, CWS, pers. comm.).

In response to the apparent decline in scoter numbers, reductions were made in 1993 in the bag limits of scoters in both the United States and Canada. Harvest of all three scoter species in Canada and the United States has declined considerably since the 1970s (Tables 13 -15), although harvest levels of Black and Surf Scoters in the Atlantic Flyway in 2003 appeared to be near historic levels.

Barrow's Goldeneye

Eastern Population

Until recently, little was known of the eastern North American population of the Barrow's Goldeneye (*Bucephala islandica*), which is believed to be composed of no more than 4,500 birds (Robert *et al.* 2003). This corresponds to a breeding population of about 1,400 pairs (30% of birds are adult females). Nearly all of the eastern population winters in Québec, mainly in the St. Lawrence River Estuary (>50%) and, to a lesser extent, in the Gulf of St. Lawrence (Robert *et al.* 2003). About 400 individuals winter in the Atlantic Provinces and in Maine. Although data is insufficiently precise to document a trend, it is believed that the population declined during the last century and that it could still be declining. In 2001, the eastern population was listed by COSEWIC as being of Special Concern.

This small population faces several threats on its breeding and wintering grounds. As it is concentrated in a few areas in winter, it is highly vulnerable to oil spills or other disasters (Robert *et al.* 2003). Because hunting could otherwise pose a threat to Barrow's Goldeneye, most areas where wintering and staging birds concentrate have been closed to hunting in Canada. Because the Barrow's Goldeneye is an arboreal species, forest exploitation is an important threat on the breeding grounds. Logging affects goldeneyes by directly destroying nests during harvesting operations and by reducing the availability of potential nest sites (Robert *et al.* 1999; M. Robert, CWS, pers. comm.).

Recent studies by the Canadian Wildlife Service in Québec have identified the main breeding area of the eastern population of the Barrow's Goldeneye. It consists mainly of the small lakes of the high plateaus north of the St. Lawrence River from the Saguenay River east to at least Mingan (Robert *et al.* 2000). It is probable that part of the population also breeds on the high plateaus west of the Saguenay River (Savard and Dupuis 1999). The first official breeding record for the eastern population was obtained in 1998 when a brood was sighted on Lac des Polices in ZEC Chauvin, a few dozen kilometers northwest of Tadoussac, Québec. Since then, several broods were observed about 60 km northwest of Sept-Îles, Québec (Robert *et al.* 2000) and in the ZEC Chauvin area in 1999 (CWS-QC, unpubl.). Satellite tracking data show that at least some Barrow's Goldeneyes wintering along the St. Lawrence corridor breed inland along the north shore of the St. Lawrence Estuary and Gulf. In fact, high numbers of pairs and lone males detected in aerial and ground surveys conducted from 1990 to 1998 indicate that this area is probably the core breeding area for the eastern population of the Barrow's Goldeneye (Robert *et al.* 2000).

In eastern North America, the only known moulting sites of adult male Barrow's Goldeneyes are located in the coastal waters of Hudson, Ungava, and Frobisher (Baffin Island) bays, and in a few coastal inlets of northern Labrador (Robert *et al.* 1999, Robert *et al.* 2002). Two moulting areas (Tasiujaq and Tuttutuuq River, Ungava Bay) were identified while tracking males with satellite telemetry in July 2000. At least 200 goldeneyes (mostly Barrow's) were at the first location, while at least 3,000 goldeneyes (mostly Common) were in the latter area (CWS, unpubl. data). Barrow's Goldeneye spent up to four months in the moulting locations, highlighting the importance of these areas in the annual cycle (Robert *et al.* 2002).

Western Population

There are no accurate population estimates or trend for the western population of the Barrow's Goldeneye. However, it is believed to be stable or slightly declining. Some short-term data are available for this population from the breeding waterfowl surveys of the southern Yukon and the interior of B.C. (Figure 26 and 27). Compared to last year, in 2004 the number of breeding pairs of Barrow's Goldeneye decreased by 15% in the southern Yukon (Hawkings and Hughes 2004), and decreased by 1% in the interior of B.C. (A. Breault, CWS, pers. comm.). Note that data for the southern Yukon (Figure 26) are scaled to a constant value for 1991, and represent departures from this constant and not an absolute density. While breeding pair numbers during the 14 years of the southern Yukon survey do not show any overall trend, breeding pairs of Barrow's Goldeneye in the interior of B.C show a decline of 9% from the long term average (1987-2003). This decrease is likely indicative of the gradual abandonment of nest box programs (resulting in reduced nest site availability) for central interior B.C. (Breault and Watts 2001).

Barrow's Goldeneye and Bufflehead research undertaken in central B.C. from 1997 to 2001 found Barrow's Goldeneye nests located primarily in abandoned Pileated Woodpecker cavities located in large Aspen trees (Evans 2003). Over 90% of all cavities were within 200m of a body of water. Barrow's Goldeneyes appeared to select more productive wetlands and invertebrate abundance within a wetland was positively correlated with duckling masses at day 40, pre-fledging survival and first year return rates.

Moulting female Barrow's Goldeneyes have been banded since 1988 in central B.C. in an area where the breeding population has also been banded. Survey and recapture data indicate that Barrow's Goldeneye females do not moult locally (with or without their broods) and that they can aggregate into small groups for the wing moult (A. Breault, CWS, pers. comm.). The differences in composition between the breeding and moulting populations indicate the Central BC experiences two different moult migrations: the local breeders depart for an unknown destination while birds of unknown origin come in and replace local breeders on breeding ponds. The geographic extent of the female Barrow's Goldeneye moult and the number of females involved is currently unknown.

Between 1995 to 2002, research in central BC employed nasal disks to mark over 800 hatch-year local ducklings to study natal return and survival rates for known-age Barrow's Goldeneye (S. Boyd, CWS and M. Evans, SFU, pers. comm.). Average first year return rate was estimated at 33% (range = 18-53%) for females but only 6% (range = 0-19%) for males. Annual survival was estimated at 34% for females in three of the four years but 73% for the other year (1997 to 1998). Male survival rate was estimated at only 8% and 55% for those same years. The reason for the high variability in survival rates is unknown. Marked females were encountered 2-3 times more often than marked males on the study area in their second year and they were recorded on twice as many ponds. These observations suggest that, although young males return to their natal area, they are much more transient than females. This may partially account for the lower apparent return and survival rates of males compared to females.

Other Sea Ducks

Information on other sea duck species from the Waterfowl Breeding Population and Habitat Survey and the Black Duck Breeding Ground Survey is presented in Tables 12 and 16. Information on Goldeneye species, Bufflehead and Hooded Merganser from the roadside surveys in the Yukon and the interior of British Columbia is presented in Figures 26 and 27.

Results from the Atlantic Coast Sea Duck Survey indicate Long-tailed Ducks (*Clangula hyemalis*, previously Oldsquaw) to be increasing in the period from 1991 to 2002 (Table 11). Historically, studies in this region indicated that Long-tailed Ducks showed no significant population trend in the traditional mid-winter counts (P = 0.30) between 1954 and 1994 (Kehoe 1996). The Waterfowl Breeding Population and Habitat Survey shows no trend for Long-tailed Ducks (Table 12).

Population Status of Geese

Breeding Conditions in the Canadian Arctic and Sub arctic Regions in 2004

Spring arrived slightly later than usual on Banks Island in the western Canadian Arctic, and was reported as average to slightly later than average on the northwestern Canadian mainland (J. Hines, pers. comm.). In the Queen Maud Gulf, despite the heavy winter snow cover, the melt was rapid and nesting began early. Nesting however appeared to be delayed for both White-fronted and Snow geese in this area, perhaps due to extensive snow cover to the south of Queen Maud Gulf which may have delayed the arrival of migrating geese (R. Alisauskas, CWS, pers. comm.). In the eastern Canadian Arctic, spring was generally late, perhaps by as much as 2 weeks in some locations, excepting the High Arctic. The late spring on Southhampton Island resulted in overall goose production to be poor (J. Leafloor, CWS, pers. comm.). Although conditions were initially delayed on Baffin Island, production appeared to be near normal (D. Caswell and S. Wendt, CWS, pers. comm.). At west Hudson Bay, nesting by Ross's geese was delayed by approximately three weeks compared to 2003, which was considered easly to average spring phenology (J. Caswell, CWS, pers. comm.). Farther south and east, in the Hudson Bay Lowlands (K. Abraham, OMNR, pers. comm.), northern Québec (J. Rodrigue, CWS, pers. comm.) and Labrador, spring-like conditions were late to very late in arriving. Breeding conditions were expected to be average to poor for most goose populations in 2004.

Snow Goose

Greater Snow Goose

Greater Snow Geese (*Chen caerulescens atlanticus*) breed in the eastern Arctic around northern Foxe Basin, northern Baffin, Bylot, Axel-Heiberg, and Ellesmere islands, and northern Greenland. They winter along the mid-Atlantic coast from New Jersey to North Carolina. During migration, the entire population stages in Québec in the marshes and agricultural lands of the St. Lawrence River Valley.

The growth of the Greater Snow Goose population from a few thousand birds in the 1930s to over 500,000 in spring migratory flights in the early 1990s has been well documented (Reed *et al.* 1998a). The rate of increase has been especially rapid during the past decade. Spring aerial surveys of the main staging area in the St. Lawrence River Valley, which generate more reliable population estimates than mid-winter surveys, have been conducted since 1965 (Hughes *et al.* 2002). However, the geese have expanded their use of agricultural habitats considerably and even this survey was unable, in recent years, to account for all of the geese staging in Québec in spring. In the late 1990s an experimental technique using a sample of radio-marked birds was employed to correct the population estimate for geese missed during the survey. While the technique was successful in two of the three years it was employed, it was abandoned after 2000 due to the high cost and logistical demands.

The annual spring photographic inventory methodology was changed in 2004 in order to get a more accurate estimate in the face of the expanding spring staging distribution of Greater Snow Geese. In 2004, five aircraft were used simultaneously (instead of the usual 3) during a one-day of survey effort (compared to 2 separate days of surveys in recent years). The spring 2004 population estimate counted during staging in the St. Lawrence River valley, was 957,600 birds, an increase of more than 40% from the 2003 estimate. Such an increase cannot be accounted for solely by good production in 2003. The revised survey methodology likely resulted in better survey timing and a more complete coverage of area used by geese, allowing a larger proportion of the population to be counted at the roost sites (Figure 28).

A study of reproductive ecology of Greater Snow geese at the Bylot Island breeding colony continued in 2004 (G. Gauthier, Laval University, pers. comm.). Spring arrived early, but snow and cold temperatures at the beginning of June during nest initiation had a negative impact on reproduction. There were an exceptionally high number of Snowy Owl nests in the goose colonies and geese nesting close to Snowy Owls likely suffered less predation than those geese nesting further from owl nest sites. However, due to a reduced nesting effort overall, reproductive success was lower than in 2003. As weather conditions during the hatching period were generally favourable (sunny and warm on most days) gosling survival of early nesting geese was expected to be good.

Age ratio counts during mid-October show on average 18% young, with a preliminary estimate of between 15 to 20%, down from the 25% estimate for 2003. The record minimum recorded in 1999 was 2% (P. Brousseau, CWS, pers. comm.).

In Canada, the 2003 fall harvest was estimated at 86,900 (Table 17), almost double the harvest in 2002 and roughly 18% above the average for the past 5-year period. In the U.S., the harvest was estimated at 36,100, similar to the 2002 estimate of 39,300 and 25% lower than the most recent 5-year average.

During the special conservation season in Québec, an estimated 32,900 birds were harvested in spring 2004 (Collins, Gobeil and Brousseau, CWS, unpubl data). This is the second lowest harvest taken during the six conservation seasons since 1999 and 35% below the average harvest for the previous five seasons (Figure 29). There are no special conservation measures undertaken in the United States for Greater Snow Geese.

Lesser Snow Goose

Lesser Snow Geese (*Chen caerulescens caerulescens*) nest in colonies throughout much of the coastal areas of the Canadian Arctic. These colonies can be grouped according to three regions: the eastern Arctic (Southampton and Baffin islands, and the western and southern shores of Hudson Bay), the central Arctic (mainland from Coppermine in the west to Gjoa Haven in the east, and western Victoria Island) and the western Arctic (Banks Island, and the Anderson and Mackenzie River deltas).

Breeding ground surveys have shown substantial growth of Lesser Snow Goose populations at several colonies and the establishment of new colonies in recent years (Batt 1998). CWS is coordinating a series of photographic inventories of major Lesser Snow Goose nesting colonies, and these results are reported below.

The increasing number of Lesser Snow Geese in the eastern and central Arctic is also shown by surveys on wintering areas (these geese are also referred to as the Mid-continent Lesser Snow Geese). Mid-winter counts increased from 0.78 million geese in 1970 to nearly 3.0 million in 1998 (Fronczak 2004; Figure 30). The 2004 mid-winter count was about 2.21 million geese (Fronczak 2004). These counts include some Ross' Geese and probably a small proportion of Lesser Snow Geese originating in western Arctic colonies. Mid-winter counts however, underestimate actual population levels, increasingly so as populations have grown (Mowbray *et al.* 2000).

Eastern Arctic Colonies

In 1997, a photographic inventory of the major Lesser Snow Goose nesting colonies in the eastern arctic was conducted, for comparison to an earlier count in the early 1970s. The Great Plain of the Koukdjuak (on Baffin Island) and Southampton Island supported an estimated 1.77 and 0.72 million nesting birds respectively in 1997. When these areas were first surveyed in 1973, there were only 446,600 and 155,800 nesting birds respectively (R. Kerbes, CWS, unpubl.), and the area where nests were found was much smaller. At west Hudson Bay, Snow Goose numbers declined by about half between 1985 and 1997, when they numbered just over 200,000 geese. Preliminary estimates from photo surveys conducted in 2003 suggest that the nesting population increased slightly between 1997 and 2003 but that most of the increase occurred north of the traditional nesting colony centered at the McConnell River, Nunavut.

In the Hudson Bay lowlands, surveys conducted between 1996 and 2001 showed the number of nesting pairs to be declining from the high recorded in 1997 when 430,000 birds were estimated nesting in the area between La Perouse Bay (Man.) and Cape Henrietta Maria (Ont.) (K. Ross, CWS, pers. comm.). In 2001 the Cape Henrietta Maria breeding population was estimated to be approximately 129,000 pairs, and a comparable survey in 2003 indicated no change (128,000). These data represent a considerable increase compared to 1973 when the nesting population was estimated at 59,200 breeding adults (R. Kerbes, CWS, unpubl.). No survey was conducted at Cape Henrietta Maria in 2004 however pairs were observed nesting there on June 10-11 and the extent of the colony appeared similar to previous years (J. Hughes, CWS, pers. comm). Fewer broods than normal were encountered during banding efforts along the Hudson Bay lowlands suggesting somewhat reduced success in 2004 (K. Abraham, OMNR, pers. comm.)

In James Bay, nesting at the small Akimiski Island colony was intermittent until 1967, and became annual beginning in 1968. Breeding numbers were usually less than 200 pairs until 1974, but increased tenfold since then (Abraham *et al.* 1999a). Between 1998 and 2000, the colony consistently had an estimated 900 breeding pairs (K. Abraham, OMNR, pers. comm.) but increased to about 1500 pairs in 2001, and was about the same in 2003.

This colony was not surveyed in 2004. In southern Hudson Bay, the colony experienced a very late spring in 2004 and gosling production is appeared to be below average (Hagey *et al.* 2004a).

Central Arctic Colonies

The central Arctic breeding population, concentrated in the Queen Maud Gulf, grew more slowly than the eastern population before the 1980s, but now appears to be increasing rapidly. Part of the rapid growth may be due to immigration of eastern Arctic birds. In 1976, there were 30 colonies with nearly 56,000 nesting Lesser Snow Geese. By 1988, the number of colonies had increased to 57 with about 280,000 nesting Lesser Snow Geese (Kerbes 1996). Information from a photographic inventory conducted in 1998 indicated that the snow goose population was in excess of 1 million scattered over 80 colonies (R. Kerbes, CWS, unpubl.). This suggests that the population had at least tripled since the last photo inventory.

At Karrak Lake in the Queen Maud Gulf, the area used by nesting Ross and Lesser Snow Geese has been increasing exponentially. In 2003 the area of terrestrial habitat occupied by nesting geese at Karrak Lake increased from 165 km^2 to 177 km^2. The extent of the area used for nesting increased again in 2004 to an estimated 201 km^2 Similarly, at the East McNaughton colony of light geese, about 90 km east of Karrak Lake, the area of terrestrial habitat occupied by nesting geese increased from 173 km^2 to 214 km^2 (R. Alisauskas, CWS, pers. comm.).

Although local conditions were favourable, nest initiation dates at the Karrak Lake colony were approximately 8 days later than average in 2004. This may have been in response to heavier snow cover found in an east-west band to the south of the Queen Maud Gulf. It is suspected that this prevented migrating geese from continuing through to the Central Arctic. In 2004, production of lesser snow geese was expected to be below average due to the late nesting effort and generally unfavourable weather conditions during incubation.

Western Arctic Colonies

More than 95% of Lesser Snow Geese in the western Canadian Arctic nest on Banks Island. This population increased substantially between the 1960s and 2002. The total nesting population increased from around 105,000 birds in 1960, to 165,000 in 1976, to over 479,000 in 1995 (Kerbes *et al.* 1999). In 2002, a photographic inventory of the colony was conducted, and indicated well over 500,000 nesting birds.

Ongoing investigations initiated by CWS are evaluating whether the Banks Island population has grown to the point where it may be necessary to stabilize its growth to prevent habitat problems associated with grubbing and grazing. In 1999, a habitat study was initiated to evaluate the impact that Snow Geese are having on the lowland tundra and on the numbers of non-game birds on Banks Island (J. Hines, CWS, pers. comm.).

Local Inuvialuit residents indicated that spring snow melt occurred at least one week later than average in 2004 and that the number of geese nesting at the Egg River colony was much lower than anticipated. Therefore, it is expected that production will be lower on average on Banks Island this year.

The remaining birds of the Western Arctic Population nest at small colonies on the mainland at the Anderson River and Kendall Island migratory bird sanctuaries. Snow Goose numbers at Kendall Island appear to be stable, while numbers at the Anderson River colony seem to be declining. At least part of the reason for the decline at Anderson River is probably related to high levels of egg depredation by grizzly bears (J. Hines, CWS, pers. comm.).

During a survey in 2004 that included the two mainland nesting areas, very few nesting geese were observed at either the Kendall Island or Anderson River Bird Sanctuaries. This possibly reflected the very late spring that occurred throughout much of the Western Canadian Arctic in 2004. Production of snow geese on the mainland will be almost nil.

Lesser Snow Geese that breed on Wrangel Island, Russia, are also of great interest to Canada, because this population migrates through Western Canada in fall and spring, and more than half of the population winters in the Fraser Delta (BC) and the nearby Skagit Delta (Wash.). The present colony of Lesser Snow Geese on Wrangel Island is all that remains of the large colonies in Siberia a century ago. Russian biologists monitoring the population have documented a decline from 120,000 nesting birds in 1970 (total population of 150,000 geese) to fewer than half that number in the 1990s (total population of 60,000-70,000 geese) (Kerbes *et al.* 1999).

2003 was reported to be a good year, as the main colony had 25,000 to 30,000 nests, and high nest success (V. Baranyuk, pers. comm.). If recruitment was as high as expected, this would mark the 7th consecutive year that the Wrangel population has not experienced a complete reproductive failure which is very different from the norm (on average, a complete failure once every 3 years). Baranyuk (pers. comm..) reported 2004 as a moderate year for Wrangel Island Snow geese, although nest success was expected to be lower than in 2003.

To manage this population (i.e. maintain control of numbers so it does not increase exponentially like the mid-continent white geese), hunting regulations were changed for 2003-04 by extending the fall hunt period on the Fraser Delta from 3 December to 4 January, providing an additional 25 days for the fall season. This should increase harvest and help reduce total numbers on the Fraser and Skagit deltas.

Harvest of Lesser Snow Geese

In the United States, Lesser Snow Geese are harvested in all four flyways, but mostly in the Mississippi and Central flyways. In 2003, the total U.S harvest estimate was 576,900 geese, an increase of 13% compared to 2002 (Table 18). In Canada, the 2003 estimated harvest was 152,400, about 21% higher than in 2002.

Since 1990, CWS Pacific and Yukon Region has conducted a special annual harvest survey of Lesser Snow Geese from the Wrangel Island population. Prior to 2003, harvest estimates have varied from a low of 623 in 1990 to a high of 1860 in 1993 (A. Breault, CWS, unpubl., Figure 31). The harvest for the 2003 hunting season was estimated at 2,014, 8% higher than the previous record high of 1993, and also 8% above the 2002 harvest (A. Breault, CWS, pers. comm.). These figures do not include adjustment for crippling loss, which is estimated at 20%.

Management of Overabundant Snow Geese

Issue

The rapid growth of most Snow Goose populations is of great concern. Assessments of the environmental effects of the rapidly growing populations of Mid-continent Lesser Snow Geese and of Greater Snow Geese were completed by working groups of Canadian and American scientists. Their analyses are contained in the comprehensive reports entitled "*Arctic Ecosystems in Peril – Report of the Arctic Goose Habitat Working Group*" (Batt 1997) and "*The Greater Snow Goose – Report of the Arctic Goose Habitat Working Group*"

(Batt 1998). The working groups concluded that the primary causes of the increase of Snow Goose populations were human induced. Improved nutrition from agricultural practices and safety in refuges has resulted in increased survival and reproductive rates of Snow Geese. These populations have become so large that they are affecting the vegetation communities on which they and other species rely at staging areas and on the breeding grounds. Grazing and grubbing by geese not only permanently removes vegetation, but also changes soil salinity, nitrogen dynamics and moisture levels. The result is the alteration or elimination of the plant communities, which in all likelihood will not be restored. Although the Arctic is vast, the areas that support breeding geese and other companion species are limited in extent and some areas are likely to become inhospitable for decades. Increasing crop damage is also an important consequence of the growing Snow Goose populations.

Regulation

Several management actions are being undertaken concurrently to curtail the rapid population growth and reduce population size to a level consistent with the carrying capacity of the habitat. One action involves increasing the mortality rate of Snow Geese by two to three times the rate achieved prior to the introduction of habitat conservation measures. Beginning in 1999 an amendment to the Migratory Birds Regulations created special conservation measures during which hunters were encouraged to take overabundant species for conservation reasons and, in some cases and subject to specific controls, to use special methods and equipment such as electronic calls and bait. The 1999 and 2000 regulations applied in selected areas of Québec and Manitoba. Beginning in spring 2001, special conservation measures were also implemented in Saskatchewan and Nunavut. The dates and locations where special conservation measures were implemented were determined through consultation with the provincial governments, other organizations and local communities.

Evaluation

Evaluation plans are being implemented to track progress toward the goals of reduced population growth and, ultimately, recovery by plant communities. For example, across the Arctic in 2004, over 14,000 Lesser Snow Geese and 13,000 Ross's geese were banded as part of a program to monitor white goose survival rates and harvest characteristics. Since 1997, more than 45,000 Snow and Ross's geese have been banded to assist in meeting these research and management objectives (D. Caswell, CWS, pers. comm.).

The special conservation measures appear to have been successful in increasing harvest rates for Greater Snow geese. The estimated harvest rates of adults (based on regular-season harvest in Canada and the U.S., and including the special conservation seasons which are in effect in Canada only) ranged from 10 to 15% in each year since 1998/98. These are much higher than the rates achieved during 1985-1997 (average harvest rate of 6%), a period of rapid population growth, and similar to harvest rates during 1975-1984 (averaging 11%) when the population was relatively small and stable (G. Gauthier, Laval University, unpubl.).

For Lesser Snow Geese, continental harvest has increased since hunting regulations were liberalized beginning in 1999. However, preliminary estimates of the adult survival rate remain high.

Proposal for 2005

For 2005, it is proposed that the special measures be maintained in Québec, Manitoba, Saskatchewan and Nunavut. A minor change to the season dates are proposed for Quebec. There is also a proposal for Manitoba and Saskatchewan, to permit the use of decoys representing white phase snow geese (white adults and pale gray young) when using electronic snow goose calls. This would apply when seasons were only open for white geese (i.e., only during spring seasons). No changes are proposed for Nunavut in 2005.

Ross' Goose

About 95% of all Ross's geese (*Chen rossii*) nest in the Queen Maud Gulf area in the central Canadian Arctic. Increasing numbers are being found along the western coast of Hudson Bay, on Baffin Southampton, and Banks islands, at La Perouse Bay, Manitoba and Cape Henrietta Maria, Ontario (Kerbes 1994, D. Caswell, CWS, pers. comm., K. Abraham, OMNR, pers. comm.). Ross's Goose nesting colonies are usually interspersed with those of Lesser Snow geese and, thus, it is difficult to accurately evaluate the size of Ross's Goose populations. Ross's geese winter in California, New Mexico, Texas and Mexico.

Ross's Goose was considered a rare species in the early 1900s. When legislation was passed to prohibit hunting in 1931, the estimated population of Ross's Goose was only 5,000 to 6,000 birds. By 1988, the breeding population had increased to more than 188,000 birds in the Queen Maud Gulf Migratory Bird Sanctuary (Kerbes 1994; Ryder and Alisauskas 1995) and to about 982,000 in 1998 (Alisauskas *et al.* 1998). Helicopter surveys on Baffin Island, in conjunction with the banding in August, indicated that there may be more than

10,000 Ross's geese present in some years (D. Caswell, CWS, pers. comm.). A new colony of nesting Ross's geese became established near the McConnell River, Nunavut in the early 1990s, and was estimated at more than 35,000 pairs in 2003 and 2004 (J. Caswell, CWS, pers. comm.). Information gathered while banding Lesser Snow geese near Cape Henrietta Maria, ON, indicated that the Ross's Goose population there may now be as large as 2,250 pairs (Abraham 2002). The largest colony of Ross's Goose is near Karrak Lake in the Queen Maud Gulf, where an estimated 479,400 nested in 2001 (Alisauskas 2001).

A recent analysis by Alisauskas *et al.* (*in press* - b) described changes in the geographic distribution of Ross's geese in winter. Over the past decade the wintering populations, and the harvest, have shifted eastward, matching the eastward expansion of the breeding populations. They also found that the continental harvest of Ross's geese began to increase in about 1994, when liberalizations were made to the normal hunting seasons. Prior to 1994, the survival rate for adults was at least 0.91, but since then have declined to about 0.80. Alisauskas *et al.* (*in press* - b) concluded that at the current rate of annual survival, the Ross's Goose population should at a minimum remain stable, or even continue to grow.

As for most arctic-nesting geese, production in 2004 was expected to be at least average (R. Alisauskas, CWS, pers. comm.).

Greater White-fronted Goose

In the past, Greater White-fronted Goose (*Anser albifrons*) surveys were conducted in early spring, but these counts were problematic when geese were too widely spread along their migration route to allow for good counts. As numbers of Mid-continent Lesser Snow geese increased in the important count areas, the surveys became even more problematic, and so they were abandoned in 1992. However, until the early to mid-1980s, the surveys did a good job of tracking the trend in Greater White-fronted Goose numbers, and indicated that the overall population grew from the late 1950s to the early 1980s (J. Hines, CWS, pers. comm.).

In 1992, a fall survey of the staging areas in Saskatchewan and Alberta was implemented, with the objective of providing an annual index of the population size of Mid-continent Greater White-fronted geese. Because it is unlikely that significant numbers of geese are present outside the survey area in most years (based on historical migration and distribution data, as well as experimental surveys), this fall inventory accounts for a consistent and significant proportion of the population (Nieman *et al.* 2001). Preliminary results for the fall of 2004 indicate a total of 644,300 geese, which represents a 22% increase compared to 2003) (Figure 32). Although the 2004 numbers were up sharply, the overall trend of the index is cause for concern with regard to the status of Mid-Continent White-fronted geese. 2004 is the first year since 2000 to show an increase in this index value. The three-year running average continues to show a decline over the past 10 years (D. Nieman, CWS, pers. comm.).

Banding of Mid-continent White fronted geese, begun in 1990 in the Queen Maud Gulf Migratory Bird Sanctuary, is providing new information about these birds and their movement, providing evidence for informed decisions about population management. Annual survival declined over this period, from a maximum of 87% in 1993 to the lowest estimate of less than 70% in 2000. Mean estimated lifespan has also decreased. At its maximum it was 7.8 years, but with survival rate equivalent to that estimated in 2000, would now be closer to 3.7 years (Alisauskas 2002a).

The estimated Canadian harvest for 2003 is 64,500, a 25% increase from 2002 but below harvest levels seen earlier in the decade (Table 20). A similar patter is seen with the U.S. harvest. There, the harvest in 2003 was roughly 216,000 birds, just slightly less than the previous year. Decreases in the annual population index, combined with increasing harvest and evidence of declining survival, are cause for caution with regard to the international management of mid-continent white-fronted geese (D. Nieman, CWS, pers. comm.).

Evidence pointed toward a modest breeding effort for White-fronted geese in the western Arctic in 2004. Aerial surveys in the Mackenzie Delta, Tuktoyuktuk Peninsula, Liverpool Bay and the Parry Peninsula identified numerous groups of what were presumed to be failed and non-breeding geese. Given those observations, and the relatively late spring that occurred in the Western Arctic in 2004, production of White-fronted geese is expected to be below average in 2004.

Canada and Cackling Geese

Until recently, geese of the species *Branta canadensis* breeding in Canada were recognized as a single species, although debate around the validity of this taxonomic clustering continued (summarized in Dickson 2000). Many authors suggested two species should be recognized: small-bodied birds with a relatively short neck and bill length, and larger-bodied birds with proportionately longer necks and bills (Mowbray 2002). In 2003, after review of genetic evidence, the American Ornithological Union identified two species of geese from the one species previously referred to as *B. canadensis* (Banks *et al.* 2003). The large bodied or *B. canadensis* group, consisting of 7 sub-species, typically nests in inland and more southerly regions, while the four sub-species of the smaller Cackling Goose (*B. hutchinsii*) more typically breed in tundra habitats (http://www.sibleyguides.com/canada_cackling.htm).

The many different races of Canada (*B. canadensis*) and Cackling (B. *hutchinsii)* geese that have part of their breeding range in Canada are grouped into 15 different management populations. The distribution of Canada and Cackling Goose populations are shown in Figure 33.

Table 19 presents overall harvest estimates in Canada and the United States. However, Canada and Cackling Goose harvest in many provinces, territories and states consists of birds from more than one population. Harvest surveys cannot differentiate among Canada and Cackling geese coming from different populations and, therefore, these surveys alone are not able to estimate the harvest level of each population. Partitioning of the harvest requires comprehensive banding programs or analysis of molecular markers. Harvest of Canada and Cackling geese has been on the rise, with the harvests for 2003 for Canada, the U.S. and the Continental total, each being the highest on record (Table 19).

North Atlantic Population (NAP) Canada Goose

Canada geese belonging to the North Atlantic Population, which is thought to be primarily composed of the subspecies *B. c. canadensis*, breed in Labrador, insular Newfoundland, and eastern Québec (including Anticosti Island) (Figure 33a). The breeding population is surveyed by the Eastern Waterfowl Survey helicopter plots. An expanded helicopter plot survey was initiated in 2001 when it became evident that neither the original Eastern Waterfowl Survey nor the fixed-wing transects carried out by the USFWS adequately covered the breeding range of this population. The additional plots are included for the first time in the most recent analysis of Eastern Waterfowl Survey data (Collins 2004). Results from the BDJV plots in Stratum 2, which approximates the breeding range of the NAP shows an increasing number of pairs (Figure 34). Total estimated indicated pairs in 2004 was 48,000 while breeding pair trend data for the period 1990-2004 show an increase of 5.1% ($P < 0.05$; 88 plots). The trend for total birds over the same interval show a population increasing at a rate of 5.5% ($P < 0.05$) with a total population in 2004 estimated at 93,400 birds.

Atlantic Population (AP) Canada Goose

Atlantic Population Canada geese (composed largely of *B. c interior)* nest throughout northern Québec, especially along Ungava Bay, the eastern shore of Hudson Bay, and in the interior of the Ungava Peninsula. They winter from New England to South Carolina, with the largest concentration occurring on the Delmarva Peninsula (Figure 33a).

In 1993, an annual breeding ground survey was implemented in northern Québec with the objective of estimating the number of breeding pairs on the Ungava Peninsula (Harvey and Rodrigue 2004). Estimates produced by this survey are not adjusted for visibility bias and thus represent an index to the population. This survey covers the three regions that were shown previously to include the highest densities of nesting geese: the region of inland tundra, the region of flat coastal tundra (coastal Ungava Bay and Hudson Bay), and the region of taiga.

In 2004, the number of Canada Geese observed as pairs or as single birds (together representing the number of indicated breeding pairs) increased 12% to 174,800, this was not statistically different from the previous year (Harvey and Rodrigue 2004; Figure 35). The population has recovered substantially from 1995 when it was at the record low level of about 30,000 breeding pairs. The lack of growth in the most recent years may be the result of relatively poor production in 2 of the past 3 years. Harvey and Rodrigue (2004) noted that since 2001 the Hudson Bay coast supports about double the number of breeding pairs found in Ungava Bay, and that average productivity may also be higher along Hudson Bay.

The 2004 nesting season was adversely affected by a very late snowmelt over most of the Ungava Peninsula. This caused geese to initiate nesting much later than usual (by about 3 weeks), and also resulted in fewer geese initiating nesting, smaller clutches being laid, and lower overall nesting success. Along Hudson Bay, a total of 187 nests were found within the 7 sites surveyed, with a mean clutch size of 3.11. This compares with 273 nests and a mean clutch size of 4.26 in 2003. Nesting success, however, was good in 2004 and was slightly higher than it was last year (83% vs 75%). Along Ungava Bay, 3 secondary sites were visited and the number of geese that initiated nesting was also down from 2003. Mean clutch size was considerably smaller in 2004 than in 2003 (3.42 versus 4.31), and nesting success was only 34% (Cotter and Nichols 2004).

In the boreal forest, where Canada Geese are counted as part of the Eastern Waterfowl Survey, the number of breeding pairs observed in 2004 was approximately the same as last year, but within the range of high values observed over the past 5 years (Figure 36; D. Bordage, CWS, pers. comm.). The region covered by the Eastern Waterfowl Survey is at the southern limit of the nesting range of AP Canada geese.

Temperate-breeding Canada Goose in eastern Canada

This population of Canada Goose nests in southern Ontario and southwestern Québec. It grew from the intentional re-establishment of local Canada Goose populations beginning in the late 1960s. They are sometimes referred to as "resident", but many migrate to spend the moulting period as far north as James and Hudson bays and northern Québec, and may winter as far south as Virginia. The population has grown quickly and expanded in range. As the population has grown, an increasing number have remained to spend the winter in southern Ontario (Dennis *et al.* 2000). In addition to the growing numbers breeding in Canada, temperate-breeding Canada Geese in the eastern United States have also increased rapidly, and large numbers of sub-adults and failed breeders move to Canada to spend the moulting period.

As recently as 1970, Canada Geese did not commonly nest in southern Ontario. However, ground plot surveys results showed an increase in number with approximately 61,900 breeding pair in the province in 2003 (Figure 37). The estimated fall flight has increased from around 15,000 birds in the mid-1970s to over 400,000 in 2003 (J. Hughes and N. North, CWS, pers. comm.). An estimated 2,000 pair of temperate-breeding Canada geese were found in southern Québec in 2000 (J. Rodrigue, CWS, pers. comm.). In 2003, CWS conducted comprehensive surveys, mainly along the St. Lawrence River, to describe the distribution and abundance of temperate-breeding Canada geese in southern Québec. A total of 3,274 Canada geese were counted along with 315 Snow geese. The primary locations of these observations were in the Lake St. Francis / Varennes areas, near Montreal (J. Rodrigue, CWS, pers. comm.).

Southern James Bay Population (SJBP) Canada Goose

The SJBP (*B. c. interior*) nest on Akimiski Island in James Bay and in the adjacent lowlands to the south and west. This population winters from southern Ontario and Michigan to Mississippi, Alabama, Georgia, and South Carolina (Figure 33a).

For some years there has been concern about the status of this population. From 1985 to 1988, mid-winter indices averaged about 154,000 birds, but in 1990 a spring breeding ground survey reported only about half that number. The spring population has been surveyed annually since then, and there has been no real change in the size of the breeding population during the survey period (Figure 38). The 2004 spring survey on Akimiski Island and the adjacent lowlands of southern James Bay produced a population estimate of 101,000 Canada Geese, a decrease of 5% compared with last year (Walton and Hughes 2004a; Figure 38). Although the overall population has fluctuated around 100,000 since 1990, the estimated number of breeding pairs on Akimiski Island declined by 25% in 2004, the lowest estimate since surveys began in 1990. Once again, few moult-migrants were present during the survey and are not considered to be a confounding factor in the results since 2000.

The peak hatching date in 2004 was around 16 to 18 June, one of the latest dates on record. Weather conditions were such that snow and ice cover remained later than is typically observed. Results of nesting ecology studies and banding drives suggested a below average production year, possibly due to the late spring in the region (Walton and Abraham 2004, Walton and Hughes, 2004a).

There is evidence that increasingly large numbers of moult-migrant temperate-breeding Canada Geese move to Akimiski Island and to adjacent areas of mainland James Bay and eastern Hudson Bay. On breeding areas they may compete for food resources with SJBP goslings and, as a result, contribute to the high gosling mortality that is observed there and the decline of the SJB population (Abraham *et al.* 1999b).

Mississippi Valley Population (MVP) Canada Goose

The breeding range for the Mississippi Valley Population (*B. c. interior*) is northern Ontario and extreme northeast Manitoba, from the Nelson River to the Attawapiskat River. This population winters largely in Wisconsin, Illinois, Michigan, western Kentucky and Tennessee (USFWS 2004; Figure 33a).

The spring population estimate in 2004 was 727,000 geese, an increase of 37% from 2003 (Walton and Hughes 2004b, Figure 39). However, the estimated number of nests was down by about 23% from last year. Flocks of moult migrants were observed in southern James Bay beginning in late May, and may have had an inflationary effect on the population estimate. Breeding phenology was similar to the late year of 2002, with the estimated peak hatch in a coastal area near Peawanuck on June 30th. Based on age ratios of birds captured during banding drives (and the difficulties experienced in locating brood flocks) gosling production is well below average in 2004 (Hagey *et al.* 2004b).

Tall Grass Prairie Population (TGPP) Cackling Goose

This population (*B. h. hutchinsii)* nests on Baffin (the Great Plain of the Koukdjuak), Southampton and King William islands, and on the Nunavut mainland primarily near the McConnell and Maguse rivers (western Hudson Bay). It winters in Oklahoma, Texas, and northeastern Mexico (USFWS 2004; Figure 33b).

Aerial surveys of TGPP Cackling geese were initiated in 1992 (Rusch *et al.* 1996) and, unlike other spring surveys, are conducted during the brood-rearing period. Population estimates available from Baffin Island from 1993 through 2004 indicate a population of about 100,000 breeding birds. In the past several years of study, there were three years when almost no young were produced (1992, 1996, and 1999). Production of TGPP Cackling geese is expected to be near average for 2004 (D. Caswell and S. Wendt, CWS, pers. comm.). TGPP Cackling geese are also counted on the wintering grounds, but because they mix with other populations of Canada and Cackling geese on wintering grounds, it is difficult to estimate population size accurately. The 2004 mid-winter survey counted 458,700 geese, a 25% reduction over the 2003 estimate (USFWS 2004).

Eastern Prairie Population (EPP) Canada Goose

This Canada Goose population (*B. c. interior*) nests in the Hudson Bay lowlands of Manitoba. The birds winter in Manitoba, Minnesota and Missouri (USFWS 2004, Raedeke *et al.* 2004; Figure 33b). Spring surveys of EPP Canada Geese have been flown annually since 1972, providing good baseline data for this population.

In 2004, the spring population was estimated at 290,700 geese, up significantly from counts in 2002 and 2003 (Raedeke *et al.*, 2004; Figure 40). The number of geese in pairs was up relative to 2003, while the number represented by singles was lower. Together, the pairs and singles were estimated at 145,500 which is near the EPP Plan objective. The number of geese in groups also increased, to 145,200, the highest value since surveys were initiated in 1972. However, counts in 2004 appeared to include a significant non-breeding component (Raedeke *et al.* 2004).

In spite of increased numbers of birds documented, breeding phenology in 2004 was the latest recorded to date. Cold temperatures resulted in late snow melt and a generally late nesting phenology, with a projected fall flight lower than that observed in 2003 (Raedeke *et al.* 2004).

Western Prairie Population (WPP)/Great Plains Population (GPP) Canada Geese

The Western Prairie Population (*B. c. interior, moffitti* and *canadensis*) breeds in eastern Saskatchewan and western Manitoba, while the Great Plains Population (*B. c. moffitti*) results from restoration efforts in Saskatchewan, North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, and Texas. Both populations winter with other Canada geese along the Missouri River in South Dakota, and on reservoirs from southwestern Kansas to Texas (Figure 33b).

Separate indices for these two populations are not available from mid-winter surveys, as the fall and winter ranges of the WPP and GPP overlap. The January 2004 count was 622,100 geese, 11% higher than that of last year. This winter population index has increased an average of 7% per year since 1995 (USFWS 2004).

Canada geese on the Canadian Prairies are also counted during the Waterfowl Breeding Population and Habitat Survey. A comparison of results from this survey and those of smaller-scale surveys in east central Saskatchewan indicated that the spring waterfowl surveys provide a good measure of trends in populations (Nieman *et al.* 2000). These could be used on an annual basis to assess the abundance of the various populations of large Canada Geese breeding on the prairies (D. Nieman, CWS, pers. comm.). Results from spring waterfowl surveys in the Canadian Prairies indicated considerable increases in the populations of WPP and GPP Canada geese of 1027% and 2117%, respectively, between 1970 and 1999 (Nieman *et al.* 2000). The spring surveys in 2004 estimated 690,000 WPP/GPP geese, which represents an increase of 4% compared to 2003 (USFWS 2004). Poorer wetland conditions in many breeding areas 2004 along with late May snow events may have affected production this year. This combination is expected to result in a fall flight similar to that seen in 2003 (USFWS 2004).

Hi-Line Population (HLP) Canada Goose

Hi-Line Population are large Canada geese (*B. c. moffitti*) that nest in southeastern Alberta, southwestern Saskatchewan, eastern Montana and Wyoming, and in Colorado. This population winters in Colorado and in central New Mexico (Figure 33c).

In January 2004, the estimated number was 215,600 geese, a 5% increase over 2003. Based on these mid-winter surveys, the number of HLP Canada geese has increased an average of 4% (P = 0.13) per year since the beginning of the surveys (USFWS 2004).

HLP Canada Geese are also counted during the Waterfowl Breeding Population and Habitat Survey. Results from the surveys in the Canadian Prairies indicated a considerable increase in the population of 1089% between 1970 and 1999 (Nieman *et al.* 2000). In 2004, the population index of 200,500 was down 13% from the previous year. A reduction in wetland number (over the long-term average) is likely to have affected production in 2004.

Short-grass Prairie Population (SGPP) Canada / Cackling Goose

The Short-grass Prairie Population of geese breeds in the western Arctic on Victoria and Jenny Lind islands, and on the Nunavut and N.W.T. mainland from Queen Maud Gulf to the Mackenzie River and south into northern Alberta. They winter in the dry agricultural lands of southeastern Colorado and northeastern New Mexico, and in the Oklahoma and Texas panhandles (Figure 33c). This population is thought to be comprised of two species of dark geese), the Lesser Canada Goose (*B. c. parvipes*) and Richardson's Cackling Goose (*B. h. hutchinsii*) (Hines *et al.* 2000).

Aerial transect surveys, covering much of the breeding range of these Canada and Cackling Goose populations in the Inuvialuit Settlement Region (ISR) on the mainland, and on Victoria and Banks Islands, were conducted in June 1989-1994 (Hines *et al.* 2000). The aerial counts indicated that there were more than 70,000 SGPP Canada and Cackling geese in or near the survey area. However, the survey did not cover all of the breeding range of geese in the ISR. It was suspected that 5,000-10,000 geese might not have been counted. Geese (predominantly *B. hutchinsii*) on Victoria Island and Banks Island have apparently increased in numbers and possibly have extended their breeding range northward over the past few decades. In contrast, results of spring waterfowl surveys suggested that SGPP Canada Geese in the boreal forest and taiga of the Northwest Territories, Yukon, and eastern Alaska had remained relatively stable since the 1960's (Hines *et al.* 2000).

The 2004 mid-winter survey gave a count of 203,600 SGPP Canada / Cackling Geese, 30% more than the 2003 count. This index has declined 17% per year since 1994 ($P < 0.001$) (USFWS 2004). The spring 2004 waterfowl surveys in the Western part of the Northwest Territories and northern Alberta estimated 97,500 geese, a 14% increase from 2003 with no statistically significant trend in this estimate over the past ten years (USWFS 2004). Spring snowmelt was earlier normal in the Queen Maud Gulf however heavy snow cover to the south may have delayed the arrival of nesting geese. Surveys from the Western Arctic mainland suggest production from SGPP geese will parallel that of White-fronted geese, however observations from Victoria Island identified good numbers of nesting Cackling geese at that location (J. Hines, CWS, pers. comm.). Overall, production is expected to be average at best (USFWS 2004). A recent analysis by Alisauskas (2002b) suggested that the mean expected lifespan of SGPP geese has been on a decline since the 1992 high of 7.1 years, to a 2000 estimate of 3.4 years. Annual survival has also dropped over that time period from 87% to 74%.

Rocky Mountain Population (RMP) Canada Goose

This population of Canada Goose nests in southern Alberta, the inter-mountain regions of Utah, Idaho, Nevada, Colorado, and Wyoming, and in western Montana. They winter in central and southern California, Arizona, Nevada, Utah, Idaho, and Montana (Figure 33c).

In January 2004, 111,600 geese were counted during the mid-winter survey. This figure represents an 11% decrease compared to 2003, however no survey was flown in Idaho this year. There is no trend in the mid-winter surveys for the period 1995-2004 (USFWS 2004). RMP Canada geese are also counted during the Waterfowl Breeding Population and Habitat Survey. Spring waterfowl surveys in southern Alberta, southwestern Saskatchewan, and Montana provided an estimate of 152,500 geese in 2004, 13% higher than the estimate obtained in 2003. Results from the surveys in the Canadian Prairies indicated a considerable increase in the population of 508% between 1970 and 1999 (Nieman *et al.* 2000). Spring population numbers for RMP have increased significantly by approximately 4% per year in the past decade (USFWS 2004). Wetland conditions were variable across the range for this subspecies in 2004; the fall flight of RMP geese is expected to be similar to 2003.

Pacific Population (PP) Canada Goose

The Pacific Population nests and winters west of the Rocky Mountains from British Columbia south through the Pacific Northwest to California (Figure 33c). In Canada, this goose population breeds in central and southern British Columbia and it comprises both migratory and non-migratory (resident) segments. The breeding segment appears to have stabilized, at least in some areas. The B.C. Cooperative Waterfowl survey indicates that the total number of PP Canada geese observed in central BC was 9% higher in 2004 than the previous year, and 41% higher than the long-term (1988-2004) average (A. Breault, CWS, pers. comm.). The non-migratory segment is concentrated in the urban and suburban areas of southwestern British Columbia (particularly the greater Vancouver and greater Victoria areas) and nearby agricultural lands (A. Breault, CWS, pers. comm.). Problem populations of resident and urban Canada Geese are primarily controlled by municipalities and through federal hunting regulations. Key management practices include egg addling (operational in the lower mainland of B.C. for over 10 years), prevention of nesting, landscape management and relocation of moulting flocks to areas where they can be subjected to hunting mortality. Split hunting seasons have been successful in increasing the number of Canada Geese harvested in some agricultural areas and special permits are issued to protect crops and property (A. Breault, CWS, pers. comm.).

Lesser Canada Goose

Lesser Canada Geese (*B. c. parvipes*) breed throughout much of Alaska and migrate along the Pacific coast to winter in Washington, Oregon, and California (Figure 33c). As they winter with other populations of Canada Geese, there is no reliable mid-winter index for this population. Using breeding population survey data as an index, it is estimated that numbers of lesser Canada geese and Taverner's Cackling geese (*B. h. taverneri*) combined declined in 2004 by 29% relative to 2003 (USFWS 2004).

Brant

Based on breeding and wintering ranges, as well as on genetic differentiation, there are four distinct populations of Brant (*Branta bernicla*) recognized in North America (Reed *et al.* 1998b; see below). Compared to most other geese, Brant are more vulnerable to sporadic heavy losses from starvation and periodic nesting failures, because of their strong dependence on specific forage plants and of the harsh environments where some populations live. This vulnerability requires careful regulation of hunting and monitoring of the status of populations (Reed *et al.* 1998b). Reed *et al.* (1998b) provide a review of the information available on this species in North America.

Atlantic Brant

This population of the subspecies *B. b. hrota* nests around Foxe Basin in the eastern low Arctic. It winters along the Atlantic Coast from Massachusetts to N. Carolina (Reed *et al.* 1998b). Based on mid-winter counts in the Atlantic Flyway, there is great fluctuation in the population size of Atlantic Brant (Figure 41; Serie and Raftovich 2004). In 2004, the mid-winter population survey gave an estimate of 129,600 Atlantic Brant, down 21% form the previous year, but just slightly below the long term (1961-2004) average of 132,700 birds. The estimate has shown an average annual increase of 2% over the period of 1995-2004 (P=0.227) (USFWS 2004). Similar to conditions observed in 2002, Atlantic Brant were late arriving on the breeding grounds because of the cold, frozen conditions along the migration route (Hudson and James Bay). Subsequent surveys in mid-August on Baffin Island, Nunavut suggest average production for 2004.

Observations by researchers and banding crews on Southampton Island, Nunavut suggest little, if any, production of brant goslings from 2001 through 2004. No goslings have been seen by banding crews in the past four years (J. Leafloor and A. Fontaine, CWS, pers. comm.). It is not known if Southampton Island was historically an important nesting area for Atlantic Brant, but observations from the late 1970s suggest more brant nested around East Bay at that time (K. Abraham, OMNR, pers. comm.).

Eastern High Arctic Brant

This group of *B. b. hrota* breeds on islands of the eastern high Arctic, migrating via Greenland and Iceland to winter in Ireland (Reed *et al.* 1998b). The number of eastern high Arctic Brant is estimated on the wintering grounds in Ireland, where it varied from less than 10,000 birds during the late 1960s to more than 19,000 in the late 1980s (the data cover the 1961-1996 period; Reed *et al.* 1998b). In fall 2002, a total of 20,253 birds was recorded from a survey of 34 wintering sites in Ireland. Accounting for missing counts at three other relatively important sites, an additional 660 birds may not have been counted (based on the averages of previous annual autumn peaks). In 2002, the total population estimate, including Icelandic counts and those Irish sites not covered, was about 20,900 (Colhoun and Robinson 2003). Initial information indicates that the breeding success in 2003 was low. Productivity, based on an aged sample of 11,082 birds, was estimated at 1.8% (mean brood size 2.2). Although the population remains relatively small; more recent censuses in Ireland and Iceland have indicated a total population size of about 28,000 EHA Brant (The Wildfowl and Wetlands Trust, pers. comm.). Detail associated with on-going satellite tracking of Eastern High Arctic Brant is available at: http://www.wwt.org.uk/brent2/.

Black Brant

This population of Brant (*B. b. nigricans*) nests in the central and western low Arctic, in Alaska and western Russia. It winters along the Pacific Coast, but mainly in Mexico (Reed *et al.* 1998b). Based on mid-winter counts in the Pacific Flyway, numbers of Black Brant are lower than in the early 1960s (Figure 42; Trost and Drut 2004). The January 2004 mid-winter index count was 111,460 birds, 10% higher than in 2003, but still somewhat below the long-term (1964-2004) average of 131,300. Note that Black Brant numbers are obtained by subtracting Western High Arctic Brant counts in north Puget Sound (Padilla, Samish, and Fidalgo bays [Wash.]; D. Kraege, WDFW, unpubl.) from the total mid-winter counts in the Pacific Flyway. It should be further noted however, that the overall Pacific Flyway counts do not include peak count estimates obtained for coastal BC (A. Breault, CWS, pers. comm.). Black Brant counts also include a small proportion of Western High Arctic Brant. In spite improvements in brant nesting effort on the Yukon Delta over the very poor year experienced in 2003 the fall flight is expected to be similar to that seen in 2003 (USFWS 2004).

There are no annual surveys of the breeding grounds, but aerial surveys of Black Brant were conducted in June 1995-1998 in the Inuvialuit Settlement Region. Results suggested that the total population for the Mackenzie Delta, Tuktoyaktuk Peninsula and Liverpool Bay likely exceeded 6,000 birds (Wiebe and Hines 1998). Results from a banding program at Tuktoyaktuk Peninsula, Campbell Island, Smoke-Moose Delta and Anderson River during 1990-1998 suggested that annual reproductive success is quite variable and sometimes low (the proportion of young birds in the population varied greatly from year to year, from 8% to 54% young) (Wiebe and Hines 1998). Preliminary mark-recapture estimates suggest however, that survival rates of adult Brant are relatively high (J. Hines, CWS, unpublished data).

Part of the Black Brant population stages along the coast of British Columbia during spring migration. It is estimated that 3,000 to 7,000 brant stop over in the Queen Charlotte Islands on their way to northern breeding grounds. Historically, large numbers of brant (1,000 to 10,000) also wintered in British Columbia. Recent estimates of the wintering population in B.C. suggest over 1,500 individuals are found at two locations including an estimated 600 to 700 individuals wintering in the Queen Charlotte Islands (Goudie and Hearne 1997). In the Boundary Bay and Robert's Banks area of the Fraser River Delta, the wintering Brant population has been generally increasing since 1992 and the peak winter population was estimated at 2,754 birds (WHA and Black Brant) during the winter of 2003-2004. This represents an increase of 140% from the 2002-2003 count of 1,150 birds and a sizable increase over the previous record peak value of 1,748 birds (A. Breault, CWS, pers. comm.). Over 20 additional Brant wintered on Vancouver Island over several recent winters, and this small wintering population might also be on the increase (A. Breault, CWS, pers. comm.). The cause of the increase in number of Brant wintering in the Fraser River Delta is unknown and it is unclear as to whether it reflects increased recruitment in the local population, re-distribution of birds from other wintering areas, a reduction in sport harvest or an influx of Western High Arctic Brant (S. Boyd, CWS, pers. comm.).

Western High Arctic Brant

This population (also known as Gray-bellied Brant) is intermediate in appearance between *B. b. nigricans* and *B. b. hrota*, and is thought by some biologists to be a unique subspecies. It breeds on islands of the western high Arctic and winters in Puget Sound (WA) (Reed *et al.* 1998b). Based on mid-winter counts, there is relatively large fluctuation in the population size of Western High Arctic Brant (Figure 42). The population is estimated to be up substantially compared to last year and is once again close to the ten-year average number. The Western High Arctic index count from Washington State for 2004 was 7,695 birds compared to 4,880 in the previous winter. Extensive snow cover on breeding areas in late June suggests there was likely a poor production year in 2004 (USFWS 2004).

Western High Arctic Brant are of high management concern given their limited number, potentially unique subspecies status, and restricted winter distribution. A study is currently under way to test the degree of genetic distinctness of the Western High Arctic Brant from other brant stocks breeding and wintering in North America (S. Boyd, CWS, pers. comm.). Other proposed and ongoing projects aim at improving the monitoring and assessment of this Brant population and at providing the demographic data necessary to quantify its dynamics (S. Boyd, CWS, pers. comm.). Information on many activities is summarized on the following web site: http://www.washingtonbrant.org/tracking/tracking.html. The site includes migration and movement maps, photos of Melville Island, capture and banding methods along with sightings of radioed birds.

Population Status of Swans

Two species of swans are native to Canada: the Tundra (*Cygnus columbianus*) and Trumpeter (*C. buccinator*) swans.

Tundra Swan

There are two populations of Tundra Swans. The western population breeds along the coastal lowlands of western Alaska and migrates through Western Canada and along the Pacific Coast. This population winters primarily in California, Utah, and the Pacific Northwest. The eastern population of Tundra Swans breeds from the Seward Peninsula of Alaska to the northeast shore of Hudson Bay and Baffin Island, and migrates through the Prairie Provinces and eastern Canada. This population winters in coastal areas from Maryland to North Carolina along the mid-Atlantic coast.

The 2004 mid winter survey estimate of Eastern Population Tundra Swans was 93,600, down 14% from 2003. These estimates however, have increased by an average of 3% annually over the last 10 years ($P < 0.02$) (USFWS 2004).

The Mackenzie Delta region is probably the most important breeding area for Tundra Swans in

Canada accounting for perhaps 1/3 of the eastern population. In 2004, surveys in this region identified reasonable numbers of nesting swans, with near average production expected in 2004 (J. Hines, CWS, pers. comm.).

The number of swans killed and retrieved in the US from the eastern population for 2003 was 2,861, down slightly from the recent average (3,397 birds annually from 1999 to 2003) (Kruse 2004). In 2003, 1,034 swans from the western population were killed and retrieved, similar to the average of 954 birds killed annually in the past five years (Kruse 2004). There are no open seasons for Tundra Swans in Canada.

Detailed information on a migration study conducted by the USFWS and USGS from March 2001 through February 2004 is available at: http://www.dnr.cornell.edu/research/tundraswan/tswan.html. An earlier migration study (Petrie and Wilcox 2003) demonstrated that eastern tundra swans migrated between the wintering areas on the Atlantic coast and staging points in the northern prairies along a narrow corridor passing through the southern Great Lakes. From there, three major routes were followed to breeding areas in western Hudson Bay, the central High Arctic and the Mackenzie River delta. Migration was of long duration, and the birds spent half the annual cycle on staging areas.

Trumpeter Swan

There are three populations of Trumpeter Swans: the Pacific Coast Population, the Rocky Mountain Population, and the Interior Population. The size of each of those populations is assessed at 5-year intervals across their entire range in North America and the most recent of those surveys was conducted in August-September 2000. The sizes of each of the three populations grew to record high levels in 2000. The Pacific Coast Population remains the largest at 17,751 birds, which is 8% higher than the 1995 estimate. The Rocky Mountain Population increased 46% since 1995 to 3,666 swans while the Interior Population now numbers 2,340 individuals, a 150% increase over 1995 (USFWS Trumpeter Swan Population Status 2000). A complete summary of the 2000 Trumpeter Swan survey can be found in the report cited above.

Over 40% of the continental population of Pacific Coast Trumpeter Swans winters over the coastline, wetlands and agricultural fields of Vancouver Island and the Fraser River valley, which is the largest wintering Trumpeter Swan population in North America. Aerial surveys of the area's Pacific Coast Population are conducted every 3 years over this entire area, to identify regional and habitat-specific trends in swan use. Estuaries, coastal marshes, farmland and freshwater lakes were the most important wintering sites on Vancouver Island and swans were distributed almost equally between tidal marshes and upland habitats in the Fraser River Valley. The survey conducted in January 2002 estimated a total of 6775 swans around Vancouver Island and in the Fraser River valley, a 4.7% decrease over the 7111 swans observed in 1998-1999. During the 2002/03 survey of Snow geese in the Fraser River Delta, swan groups were either counted (if less than roughly 20) or photographed. Pictures were subsequently analyzed for total count and percent young. The 2002/03 surveys identified 295 (15.3% young) swans in the Fraser River Delta, 72% lower than in the previous year, and 56% below the long term average (1987-2001) 0f 669 swans. Tundra and Mute Swans each accounted for less than 0.5% of all the swans seen (CWS and Ducks Unlimited Canada unpubl. data). The next scheduled survey is planned for the 2004-2005 winter.

Since 1999, at least 868 Trumpeter Swans have died of lead poisoning in the Fraser River valley and in adjacent areas of Washington State. Lead poisoning losses are responsible for some of the decline in the number of wintering trumpeter swans observed since 1998. International efforts overseen by the Washington Department of Fish and Game and the Canadian Wildlife Service were initiated in 2001 to locate the source(s) of lead. These efforts have focused on population surveys conducted by volunteers, trapping and telemetry of banded birds to characterise habitat use, monitoring of roost sites to track and collect sick birds and post-mortem examinations of dead birds to confirm the cause of death.

Trumpeter Swans were captured in the Yukon and British Columbia in July 2003 under a collaborative project involving the Trumpeter Swan Society, the US Fish and Wildlife Service, Ducks Unlimited (Canada), the Alsek Renewable Resource Council, the Champagne/Aishihik First Nation, the Teslin Renewable Resource Council, the Teslin Tlingit Council, the White River First Nation and the Canadian Wildlife Service (Prairie and Northern and Pacific and Yukon Region). The objective of the banding was to i) identify migration routes, wintering areas and key habitats of Trumpeter Swans that summer in the Yukon and British Columbia; ii) determine the western limits of the summer range of Trumpeter Swans that winter in the greater Yellowstone region and the eastern limits of the summer range of Trumpeter Swans that migrate through central British Columbia to other wintering areas; and iii) gather genetic samples to help clarify the relationships among Trumpeter Swan breeding populations.

A total of 28 flightless moulting swans were captured along a transect extending from Beaver Creek, Yukon to Fort St. John, British Columbia (a linear distance of approximately 1,400 km). Eight adult birds were fitted with satellite transmitters mounted on neckbands and the others were equipped with coloured neck bands. The 2003 captures took place to the south and west of the 2002 capture efforts. The satellite and ground re-sightings should complement our understanding of the affiliation of various breeding groups to specific wintering locations and assist with a better identification of the Trumpeter Swan populations. Radio locations and other information will be provided on the Shadow-A-Swan website (http://www.uen.org/swan/).

Population Status of Other Hunted Migratory Birds

Except for murres, the harvest of other migratory game birds is estimated through annual questionnaire surveys sent to MGBHP holders in Canada (National Harvest Survey) and to migratory bird hunters in the U.S. (Harvest Information Program (HIP) Waterfowl Hunter Questionnaire Survey).

Thick-Billed and Common Murres

Thick-billed Murres (*Uria lomvia*) and Common Murres (*U. aalge*) have traditionally been hunted off the coast of Newfoundland and Labrador. Murres have a limited ability to rebuild their numbers, as they first breed only at the age of four or five and then lay only one egg each year. If over-harvested, murre populations would take a long time to recover. An analysis in the early 1990s of the demography of murres and the impacts of harvesting suggested that the annual harvest was unsustainable at that time. The number of Thick-billed Murres in the northwest Atlantic has been estimated to be 1.5 million breeding pairs in the Canadian Arctic and 375,000 breeding pairs in Greenland (S. Gilliland, CWS, pers. comm.). The number of Common Murres breeding in Newfoundland and Labrador had been estimated to be 500,000 pairs (S. Gilliland, CWS, pers. comm.).

Since the 1970s, Thick-billed Murre numbers in selected colonies in the Eastern Canadian Arctic have been monitored by counts of occupied breeding sites on fixed study plots scattered throughout. The trend from 2000 to 2002 indicates a sharp drop, with indices at two colonies falling by 25% ($P < 0.01$) and 9% ($P < 0.05$) since 2000. The cause of the recent population downturn is not known, but is probably related to events in the wintering grounds rather than the breeding grounds. During the period 1976-2000, trends in these monitoring counts were generally either stable or positive (up 1 to 2% / year, $P < 0.01$), except for a sharp fall in numbers in 1989 and 1990 ($P < 0.01$) (T. Gaston, CWS, pers. comm.).

Beginning in the 1993-1994 hunting season, CWS implemented restrictions on murre hunting in Newfoundland and Labrador. The restrictions were designed to reduce the harvest of murres by up to 50%, to eliminate excessive kills that lead to illegal sale, and to provide additional protection to other seabirds such as razorbills (*Alca torda*). These interim restrictions had been taken while steps were underway to amend the Migratory Birds Convention between Canada and the United States. Beginning with the 2000-2001 hunting season, an amendment to the Convention now enables murres to be managed through the usual regulatory approaches.

The annual murre harvest has been estimated several times since the 1977-1978 hunting season using a special survey mailed to Migratory Game Bird Hunting Permit holders. Overall, murre harvest has declined since the late 1970s, with the lowest estimates from the last three surveys, which followed the imposition of hunting restrictions. Excluding the very high estimate for 1982-1983, the average harvest estimate for permit holders prior to hunting restrictions was about 400,000 birds per year, compared to 134,000 birds per year after hunting restrictions. Thus, the annual harvest was reduced by about 66%, exceeding the target of 50%. Accounting for murre hunters who, until 2000, were not required to purchase a hunting permit, the total annual harvest of murres was assessed at about 250,000 to 300,000 birds between 1996 and 1998, compared to 600,000 to 900,000 birds prior to hunting restrictions.

The hunting season of 2001/02 was the first year when all murre hunters were required to purchase a hunting permit, and hence the first year that total murre harvest could be estimated. The results indicated that there were about 6,400 murre hunters in Newfoundland and Labrador in 2001/02, of which about 18% bought permits just to hunt murres. In 2002/03, the estimate was essentially unchanged at about 6,500 hunters. The total estimated harvest for 2001/02 was about 186,000 murres, while in 2002/03 harvest was estimated at 158,000 birds. Special surveys of murre hunters were not conducted in 2003/04.

American Woodcock

The status of American Woodcock (*Scolopax minor*) in North America is monitored through the Singing-ground Survey, which consists of a spring count of male courtship displays at dusk. Counts of singing males provide indices to American

Woodcock populations and can be used to monitor annual population changes (Kelley 2004). The survey covers the central and northern portions of the woodcock breeding range. Analyses of band recoveries indicate that there are two relatively discrete populations, and as a result, American Woodcock are managed on the basis of two regions, Eastern and Central. In Canada, woodcock breeding in Manitoba and Ontario belong to the Central Population, while those breeding in Québec and in the Maritimes are part of the Eastern Population.

The numbers of American Woodcock displaying during the 2004 singing ground survey in both the Eastern and Central Regions were not significantly different ($P > 0.1$) from 2003 levels (Kelley 2004; Figure 43). Over the 1995-2004 period, there was no significant trend in counts for both Eastern and Central populations. This is the first time since 1992 that a significant decline in singing ground counts was not detected. Long-term trends (1968-2004) however, continue to indicate a decline ($P < 0.01$) of woodcock breeding populations in the Eastern (- 1% per year) and Central (-1.8%) regions (Kelley 2004).

In Canada, the number of American Woodcock displaying during the 2004 Singing-ground Survey did not differ significantly from 2003 (Kelley 2004) (however, note that these results are based solely on information submitted by May 30). Counts over the 1995-2004 period showed a significant increasing trend for woodcock breeding populations in New Brunswick (2.6%; $P < 0.05$) and Nova Scotia (3.0%; $P < 0.10$). Trends over the long-term (1968-2003) showed a significant decline in Ontario (-1.8%; $P < 0.01$) and Manitoba (-3.5%; $P < 0.05$) (note that Manitoba began participating in the Singing-ground Survey in 1990). The major causes of American Woodcock population declines are believed to be degradation and loss of suitable habitat on both the wintering and breeding grounds (Kelley 2004).

An indirect measurement of recruitment, or annual productivity, of woodcock breeding populations is derived from age ratios of wings collected in the harvest (Wing-collection Survey). The 2003 recruitment index of 1.5 for the Eastern region was essentially unchanged since 2000, but was 12% below the long-term (1963-2004) average. The index of 1.4 for the Central Region was slightly lower than the previous year, and remains slightly below the long-term (1963-2004) of 1.6 (Kelley 2004).

The harvest of American Woodcock in Canada and the U.S. has been declining over the years; this decline, however, has been much more pronounced in the United States (Figure 44). In 2003, there were 34,600 woodcock harvested in Canada, down 38% from the ten-year average (Figure 44). Bateman and Hicks (2004) indicated that the number of woodcock hunters is undergoing a long-term decline, but the harvest per hunter is increasing. In the U.S., the 2003 harvest was estimated at 302,600 woodcock, up 18% compared to last year, but 8% below the ten-year average. This change in estimated harvest should be treated with caution, as it may be related to the revised Harvest Information Program implemented in the U.S. in 1999.

Mourning Dove

Mourning Doves (*Zenaida macroura*) are among the most widely distributed and abundant birds in North America, and are monitored in Canada through the Breeding Bird Survey (http://www.cws-scf.ec.gc.ca/birds/Trends/disclaimer_e.cfm). Dove populations in the Prairie potholes, Boreal Hardwood Transition, Lower Great Lakes/ St. Lawrence Plain ecozones, and Atlantic Northern Forest as well as the entire country have increased significantly ($P < 0.05$) over the long-term (1968-2002). Populations in the Boreal / Taiga Plains, Great Basin and Northern Rockies ecozones do not show any significant trend over that time period. During the last ten years, mourning doves in the Boreal-Hardwood Transition, Great Lakes/ St. Lawrence Plain, and the Atlantic Northern Forest, as well as the entire country have been significantly increasing ($P < 0.05$). Populations in the Boreal / Taiga Plains have been significantly decreasing ($P < 0.05$).

In the U.S., Mourning Dove populations are monitored through the Mourning Dove Call-count Survey, which has been developed to provide an annual index to population size during the breeding season (Dolton and Rau 2004). Mourning Doves in the U.S. are managed on the basis of the three regions where dove populations are largely independent. These areas are referred to as the Eastern, Central, and Western Management Units. Over the long term (1966-2004) all three Units exhibited significant declines for doves heard. Over the recent decade, no trend was evident in any of the three Management Units (Dolton and Rau 2004).

In 2003, dove hunting was permitted in 19 of 27 states in the Eastern Management Unit, and in 12 of 14 states in the Central Management Unit. All seven states that comprise the Western Management Unit permit the hunting of Mourning Doves (Dolton and Rau 2004). In Canada, Mourning Doves are hunted only in British Columbia. The harvest there has varied considerably from year to year, ranging from an estimated high of 5,391 doves killed in 1977 to 199 during the 2003 season. The long-term decline in Mourning Doves in southern British Columbia resulted in the implementation of hunting restrictions beginning in 1994. Preliminary estimates of harvest in the U.S. in 2003 was 18.2 million, down approximately 20% over the previous year (Dolton and Rau, 2004).

Common Snipe

Common Snipe (*Gallinago gallinago*) in Canada are also monitored through the Breeding Bird Survey (http://www.cws-scf.ec.gc.ca/birds/Trends/disclaimer_e.cfm). Populations of Common Snipe in the Prairie Ecozone have increased significantly ($P < 0.05$) over the long-term (1968-2002). Populations in the Great Basin and Atlantic Forest ecozones showed a significant decline over that time period. Elsewhere in the country there was no trend indicated. The harvest of Common Snipe in Canada has also been declining over the years (Figure 45). In 2003, there were 9,621 snipe harvested in Canada. The estimated harvest in the U.S for 2003 increased by 65% to 209,500 from the previous year (P. Padding, USFWS, pers. comm.).

Sandhill Crane

The Mid-continent Population of Sandhill Cranes is the largest of all North American crane populations. This population is comprised of approximately two-thirds Lesser (*Grus canadensis canadensis*), one-fourth Canadian (*G. c. rowani*), and the remainder Greater Sandhill Cranes (*G. c. tabida*). Mid-continent Sandhill Cranes breed from southern Ontario northwestward through the Arctic, Alaska, and into eastern Siberia. This population winters in western Oklahoma, eastern New Mexico, Texas, southward into Mexico, and westward into Arizona (Sharp *et al*. 2004).

The Mid-continent Population of Sandhill Cranes is monitored through a spring aerial transect survey. Indices corrected for visibility bias are available since 1982. The partial population index in spring 2004 (Central Platte River Valley only, not corrected for visibility) was 356,900 birds (Sharp *et al*. 2004) (Figure 46). This represents a 19% increase in population size over the comparable areal coverage for 2003. Overall however, there does not seem to be any trend in population abundance since 1982.

The Canadian hunting season for Mid-continent Sandhill Cranes is currently open only in Manitoba, Saskatchewan, and the Yukon Territory. The crane harvest in Canada has been quite variable, tending toward an increase in Saskatchewan in recent years (Figure 47). The overall Canadian harvest of Mid-continent Sandhill Cranes was 9,600 in 2003 (Saskatchewan and Manitoba combined); an increase of 22% compared to 2002 (Figure 47). No cranes were reported harvested in the Yukon in 2003. The harvest of Mid-continent Sandhill Cranes has been increasing in the U.S. over the years. The crane harvest in the U.S. increased by 35% to 19,200 in 2003 compared to 2002 (Sharp *et al*. 2004).

Band-tailed Pigeon

We have little information on the status of Band-tailed Pigeons (*Columba fasciata*), which are found in forested habitats in coastal British Columbia. This species has a very low reproductive rate of one egg per pair, and some nest twice each season. Results from the Breeding Bird Survey (http://www.cws-scf.ec.gc.ca/birds/Trends/disclaimer_e.cfm) indicate a non-significant long-term (1968-2002) decline in the population, which is consistent with the declines seen throughout the Pacific Flyway.

In British Columbia, a preliminary survey of Band-tailed Pigeons was assessed at 12 mineral sites in 2001 as part of a project to develop a Flyway-wide mineral site index covering California, Washington, Oregon and British Columbia (Casazza and Pacific Flyway Band-tailed Pigeon Sub-committee, pers. comm.). Weekly counts were conducted at four heavily used sites in the Fraser Valley from June to August 2001 and 2002 to assess use of each mineral site. Mineral site surveys are now conducted annually at four sites in SW BC; these surveys are integrated with those from other jurisdictions to produce a Pacific Flyway Band-tailed Pigeon index. Preliminary analysis of the BC data in 2004 suggest a 50% decline compared to the 2003 counts (Breault and Griggs, CWS, pers. comm.). The Canadian hunting season for this species was closed from 1994 through 2001. Population increases in Washington State were primarily responsible for the limited opening implemented in British Columbia in 2001 (where bag limit was decreased from 10 birds to 5 and the season length decreased from 30 to 15 days). An estimated 153 pigeons were harvested during the September 2003 hunting season. The estimated total U.S. harvest for 2003 was 17,200 band-tailed pigeons.

American Coot

During the Waterfowl Breeding Population and Habitat Survey, American Coots (*Fulica americana*) are also recorded in the Canadian Prairies. Results of this survey show that American Coot population estimates have greatly fluctuated (Figure 48). In recent years, however, the population has maintained itself at levels substantially higher than seen during the 1980s and early 1990s. The 2004 population estimate of 860,300 coots, down roughly 11% from the previous year (963,500).

The harvest of American Coots in Canada has decreased considerably over time. In 2003, the

American Coot harvest was estimated at slightly greater than 2,500 birds, an increase of 28% over the previous year. Total harvest in the U.S. in 2003 was estimated at 194,000 (Trost and Drut 2004).

Rails

Rails are counted during the Breeding Bird Survey (BBS), but there is trend information only for Virginia Rails (*Rallus limicola*; country as a whole, and over the long term only) and Sora (*Porzana carolina*; Boreal Shield, Boreal Plains, Prairies, and Montane Cordillera ecozones, as well as the country as a whole) (http://www.cws-scf.ec.gc.ca/birds/Trends/disclaimer_e.cfm). Trends are not reliable for the Yellow Rail (*Coturnicops noveboracensis*), because of relatively low numbers of counts.

For Virginia Rails there were no significant long-term (1968-2002) or short-term (1993-2002) population trends indicated in any ecozone or in the country as a whole. Sora population indices showed a significant increase in the Atlantic Northern Forest ecozone over the long term. Because rails are often secretive and do not call often, they are more likely to be missed during the BBS, and therefore results of trend analyses should be used with caution (C. Downes, CWS, pers. comm.).

The only province with an open season for hunting rails is Ontario (excluding King Rails [*Rallus elegans*] and Yellow Rails [*Coturnicops noveboracensis*]). Previously there were seasons in other provinces but they have been closed in recent years. The rail hunting season was closed in Alberta in 1990, in Québec and the Yukon Territory in 1992, and in Manitoba and the Northwest Territories in 1993. The collection of harvest data for rails began in 1989 as part of the National Harvest Survey. Since that time, approximately 100 to 4,000 rails are harvested annually with an estimated 216 rails harvested in Ontario in 2003.

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Appendices

APPENDIX A - *Special Conservation Measures - Proposals for 2005*

For 2005, it is proposed that special conservation measures be maintained in Québec, Manitoba, Saskatchewan and Nunavut. Minor changes to the dates in Québec are proposed, as shown below. In Manitoba and Saskatchewan, decoys that represent both white and blue phase, and juvenile snow geese, will be permitted to improve hunter success when using electronic calls. This will only be in force during the period when white goose only can be hunted and will allow hunters to use sets of decoys that mimic family groups while using snow goose call recordings. In Nunavut, the regulation is unchanged from last year.

MEASURES IN QUEBEC CONCERNING OVERABUNDANT SPECIES

	Column 1	Column 2	Column 3
Item	Area	Period during which Snow Geese may be killed	Additional hunting method or equipment
1.	District A	May 1 to June 30 and September 1 to December 10	Recorded bird calls (*d*)(*f*)
2.	District B	September 17 to December 26	Recorded bird calls (*d*) (*f*)
3.	District C and D	April 1 to May 31 (*a*), September 6 to September 16 (*a*) and September 17 to December 26	Recorded bird calls (d) (*f*)
5.	District E	April 1 to May 31 (*a*) and September 6 to September 16 (a) and September 17 to December 26	Recorded bird calls (*d*)(f) and bait or bait crop area (*e*)
6	District F,G,H,I	April 1 to May 31 (*a*),(*b*),(*c*) September 6 to September 23 (*a*), and September 24 to December 26	Recorded bird calls (d)(f) and bait or bait crop area (e)
7.	District J	September 24 to December 26	Recorded bird calls (d)(f)

(*a*) Hunting is allowed only on farmland.

(*b*) In District F, no person shall hunt south of the St. Lawrence River and north of the road right-of-way of Route #132 between Forgues Street at Berthier-sur-Mer and the eastern limit of Cap St-Ignace municipality.

(*c*) In District G, on the north shore of the St. Lawrence River, no person shall hunt north of the St. Lawrence River and south of a line located at 1 000 m north of highway no. 40 between Montée St-Laurent and the Maskinongé River. On the south shore of the St. Lawrence River, no person shall hunt south of the St. Lawrence River and north of the railroad right-of-way located near Route #132 between the Nicolet River in the east and Lacerte Road in the west.

(d) "Recorded bird calls" refers to bird calls of a species referred to in the heading of column 2.

(e) Hunting with bait or in a bait crop area is permitted if the Regional Director has given consent in writing pursuant to section 23.3.

(f) If decoys are used when hunting with recorded bird calls, the decoys must represent white-phase Snow Geese.

MEASURES IN MANITOBA CONCERNING OVERABUNDANT SPECIES
(NO CHANGES)

Item	Column 1 Area	Column 2 Period during which Snow Geese may be killed	Column 3 Additional hunting method or equipment
1.	Zone 1	April 1 to May 31 and August 15 to August 31	Recorded bird calls *(a)(b)*
2.	Zone 2	April 1 to May 31	Recorded bird calls *(a)(b)*
3.	Zone 3	April 1 to May 31	Recorded bird calls *(a)(b)*
4.	Zone 4	April 1 to May 31	Recorded bird calls *(a)(b)*

(a) "Recorded bird calls" refers to bird calls of a species referred to in the heading of column 2.

(b) If using decoys when hunting with recorded bird calls, decoys must be white.

MEASURES IN SASKATCHEWAN CONCERNING OVERABUNDANT SPECIES
(ONE DATE CHANGE)

	Column 1	Column 2	Column 3
Item	Area	Period during which Snow Geese may be killed	Additional hunting method or equipment
1.	East of 106° W Longitude	April 1 to May 31	Recorded bird calls *(a)* (b)
2.	West of 106° W Longitude	April 1 to April 30	Recorded bird calls *(a)* (b)

(a) "Recorded bird calls" refers to bird calls of a species referred to in the heading of column 2.

(b) If using decoys when hunting with recorded bird calls, decoys must be white.

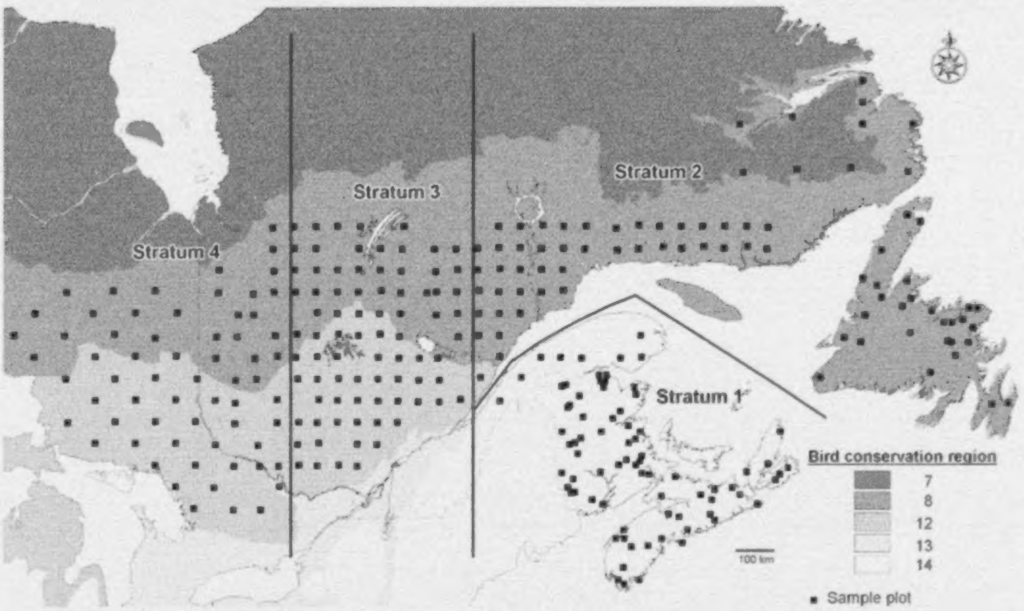
MEASURES IN NUNAVUT CONCERNING OVERABUNDANT SPECIES
(NO CHANGES)

	Column 1	Column 2	Column 3
Item	Area	Period during which Snow Geese may be killed	Additional hunting method or equipment
1.	Throughout Nunavut	May 1 - June 7	Recorded bird calls *(a)*(b)

(c) "Recorded bird calls" refers to bird calls of a species referred to in the heading of column 2.

(d) If using decoys when hunting with recorded bird calls, decoys must be white.

Figures


Stratum 2
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Stratum 4
Stratum 1
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Sample plot
100 km

Figure 1. Black Duck Breeding Ground Survey Area of Eastern Canada.
(provided by C. Lepage et M. Melançon)

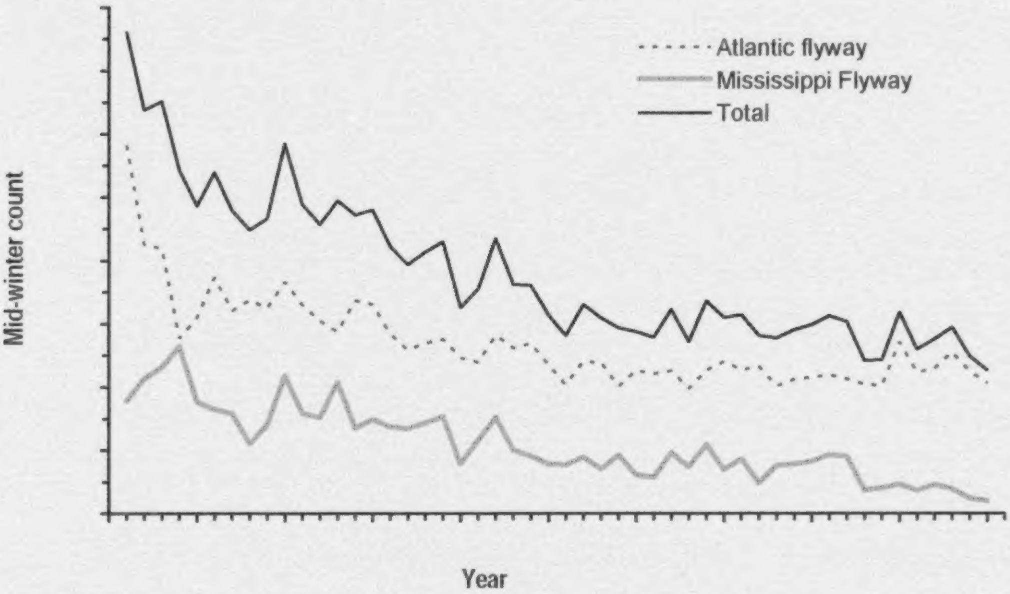


Figure 2. American Black Ducks in the Atlantic and Mississippi Flyways in Mid-winter.
Survey results in the Atlantic Flyway for 2001 and in the Mississippi Flyway for 1993 and 1997 were incomplete in some states.

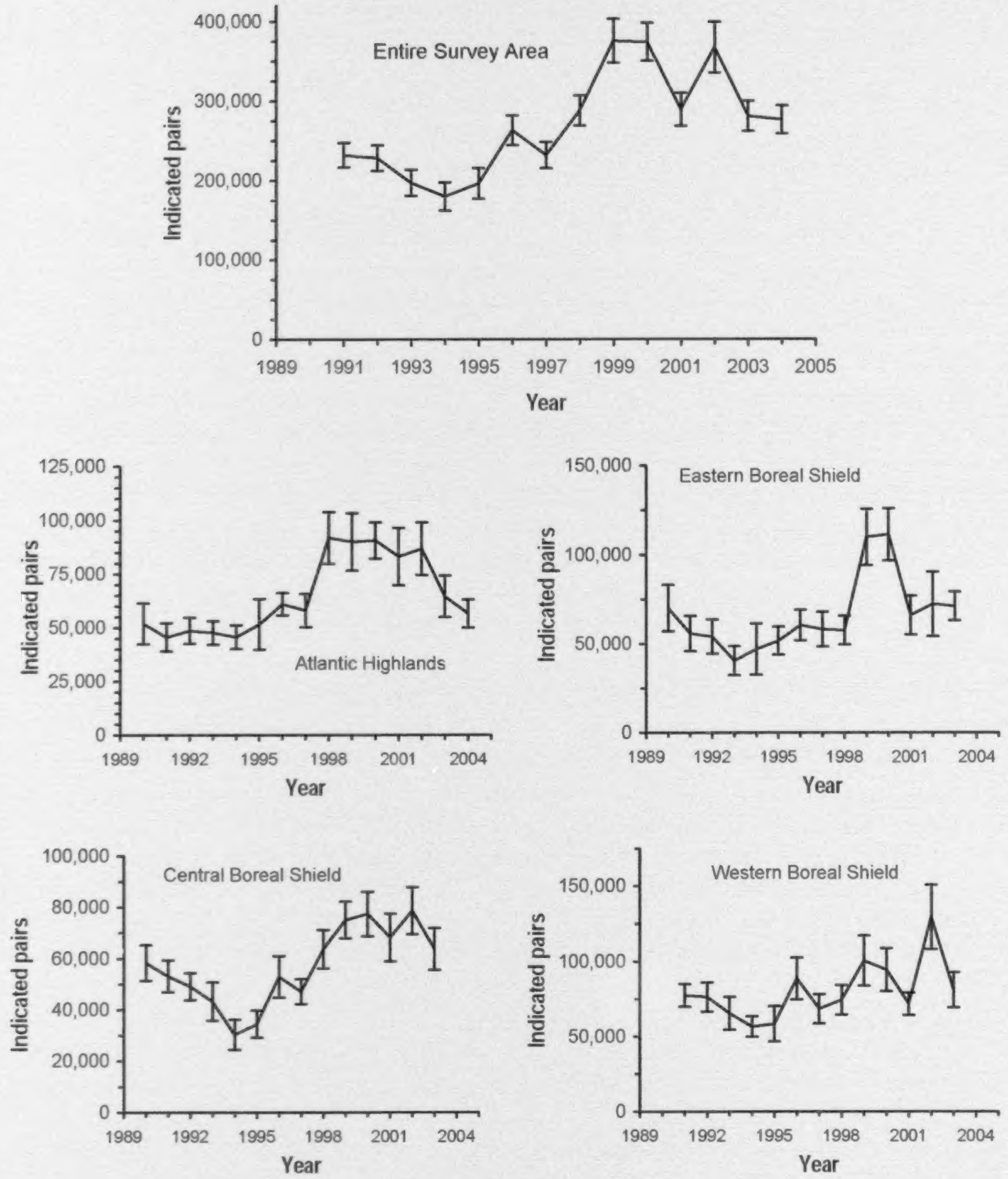


Figure 3. American Black Ducks in the Black Duck Breeding Ground Survey Area of Eastern Canada; Breeding Pairs.

Estimated number of indicated pairs (± 1 SE) (Collins 2004). The 1990 data in the western portion of the boreal shield region were not comparable with other years and were therefore excluded.

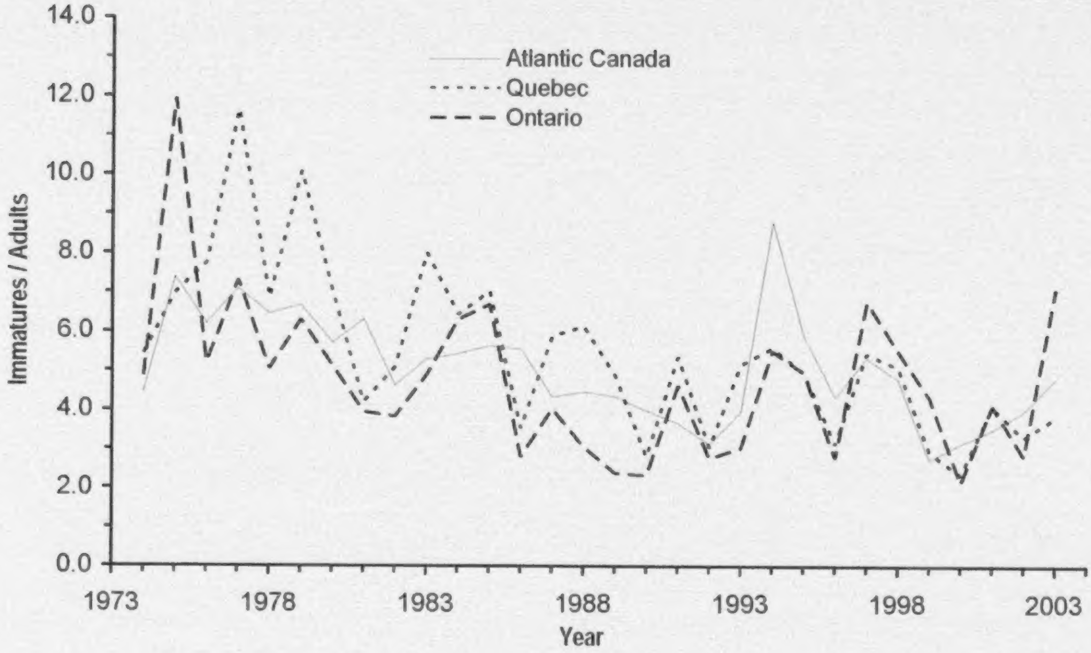


Figure 4. Black Duck Age Ratios in Eastern Canada Harvest.

Age ratios are not adjusted for differential vulnerability to harvest of juveniles and adults

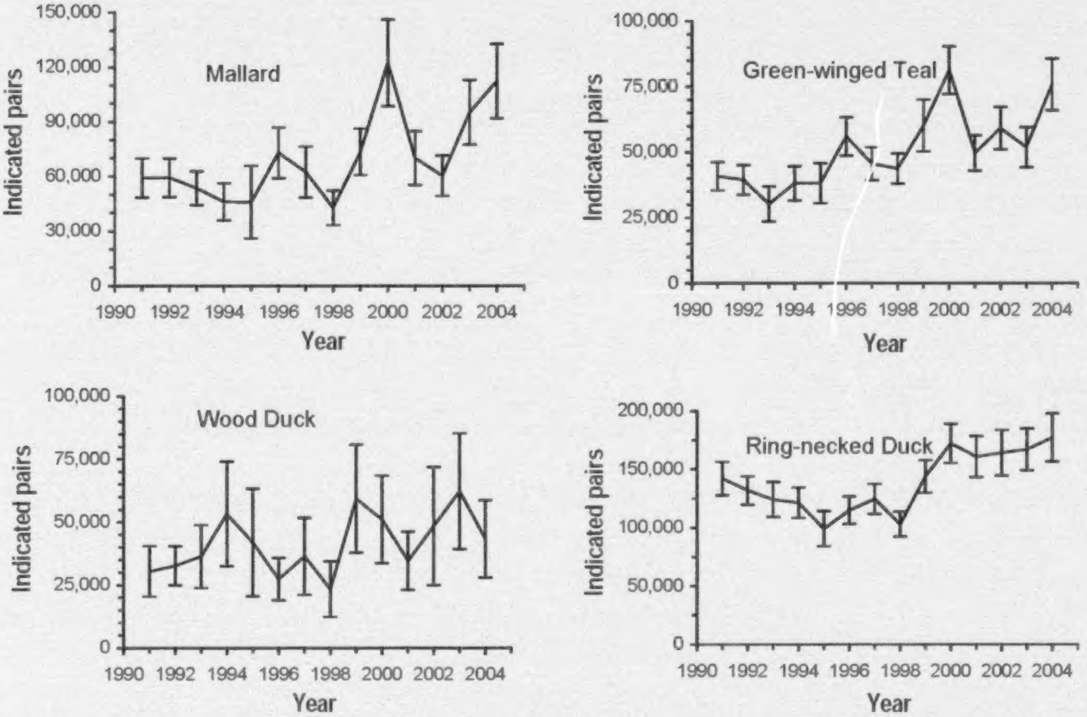
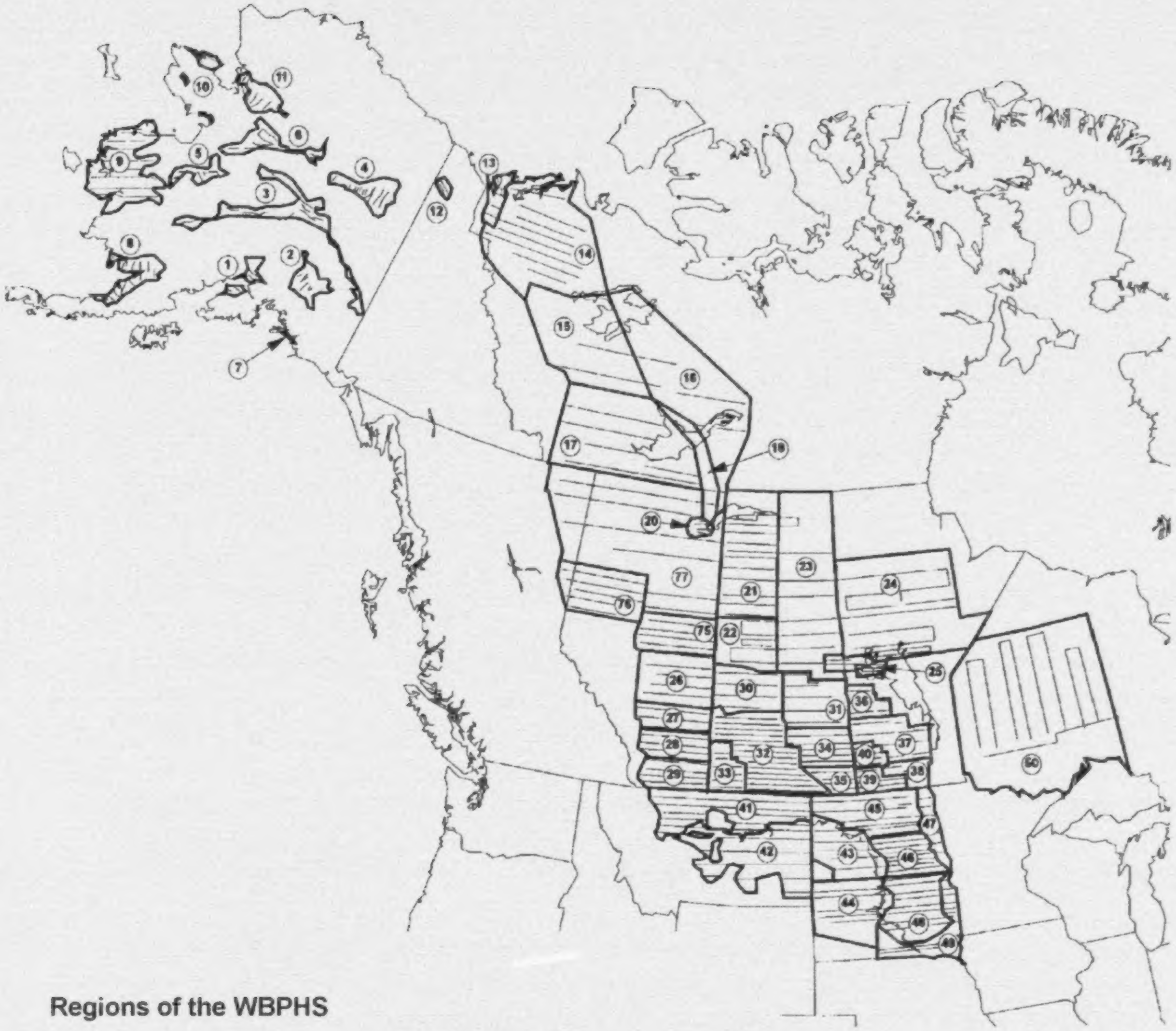


Figure 5. Other Abundant Inland Ducks of the Black Duck Breeding Ground Survey Area.

Estimated number of indicated pairs (± 1 SE) in the entire survey area of the Black Duck Breeding Ground Survey of Eastern Canada (Collins 2004). The 1990 data in the western portion of the boreal shield region were not comparable with other years and were therefore excluded.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Regions of the WBPHS

1. Strata 1-11	Alaska
2. Strata 12 –25, 50, 75-77	Western Boreal Canada
3. Strata 26-40	Canadian Prairies
4. Strata 41-49	U.S. Prairies

Figure 6. Waterfowl Breeding Population and Habitat Survey of Western Canada, traditional survey area of Western Canada and the United States.

(US Department of the Interior and Environment Canada)

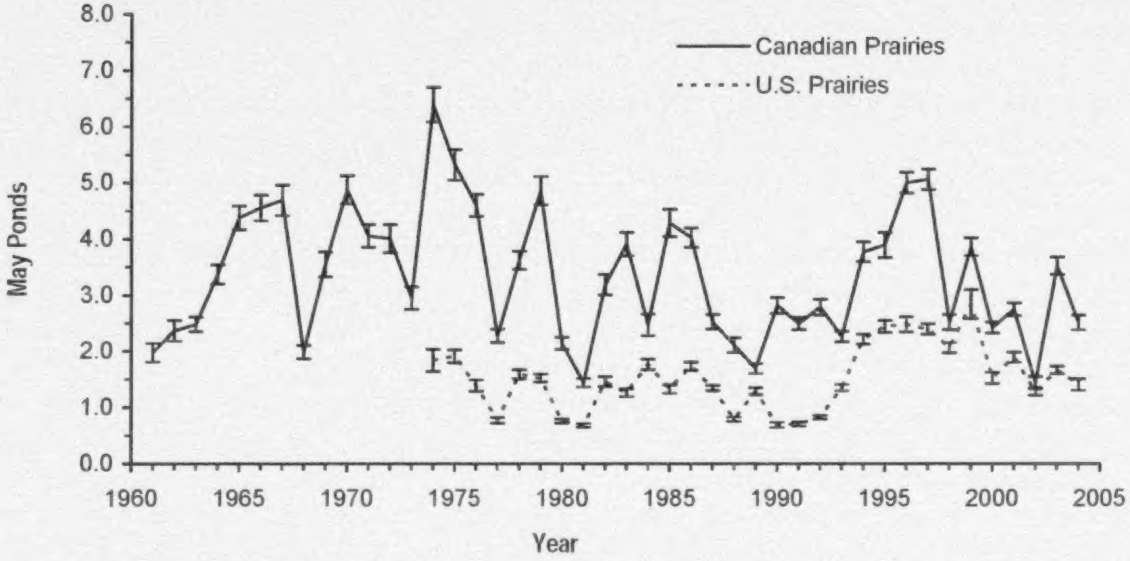


Figure 7. May Ponds in the Canadian and U.S. Prairies.

Estimated number of ponds ± 1 SE.

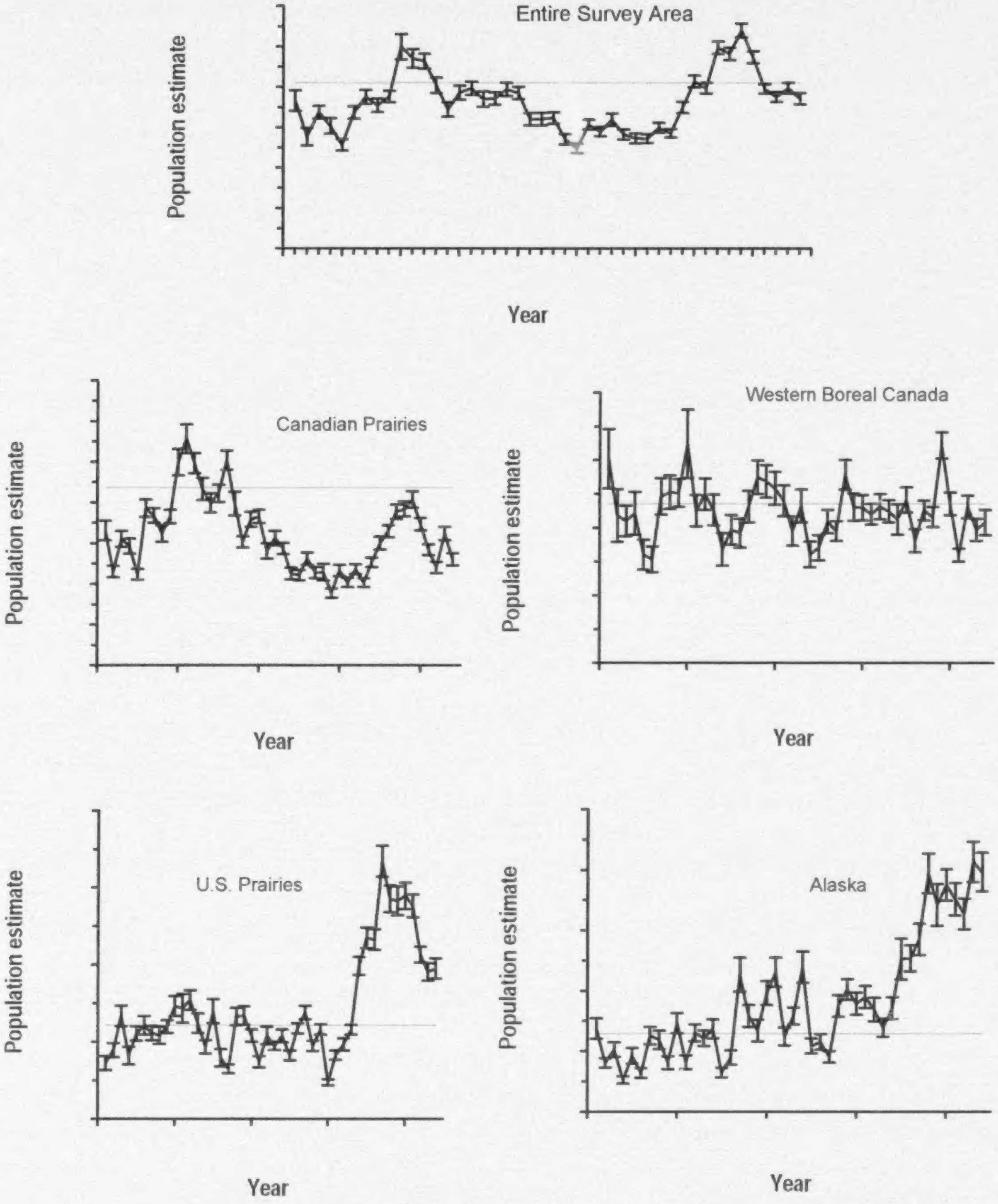


Figure 8. Mallard Breeding Population in the Survey Area of the Waterfowl Breeding Population and Habitat Survey.

Estimates (± 1 SE) in the traditional survey area of the Waterfowl Breeding Population and Habitat Survey. The horizontal line represents the NAWMP population goal.

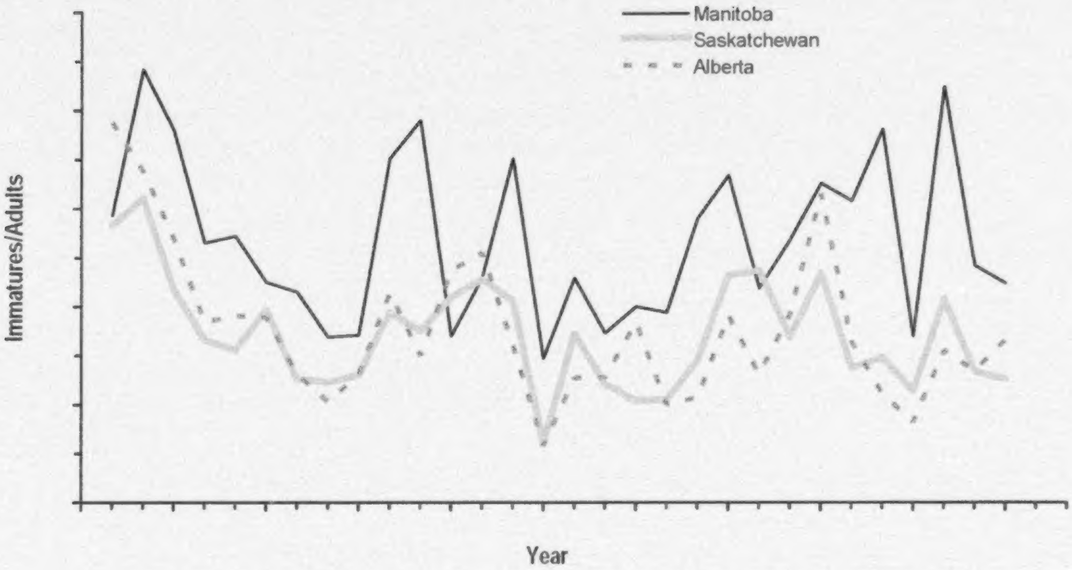


Figure 9. Mallard Age Ratios in the Harvest in the Canadian Prairies.

Age ratios are not adjusted for the differential vulnerability to harvest of juveniles and adults. (J.F. Gobeil and B.T. Collins, CWS, unpublished).

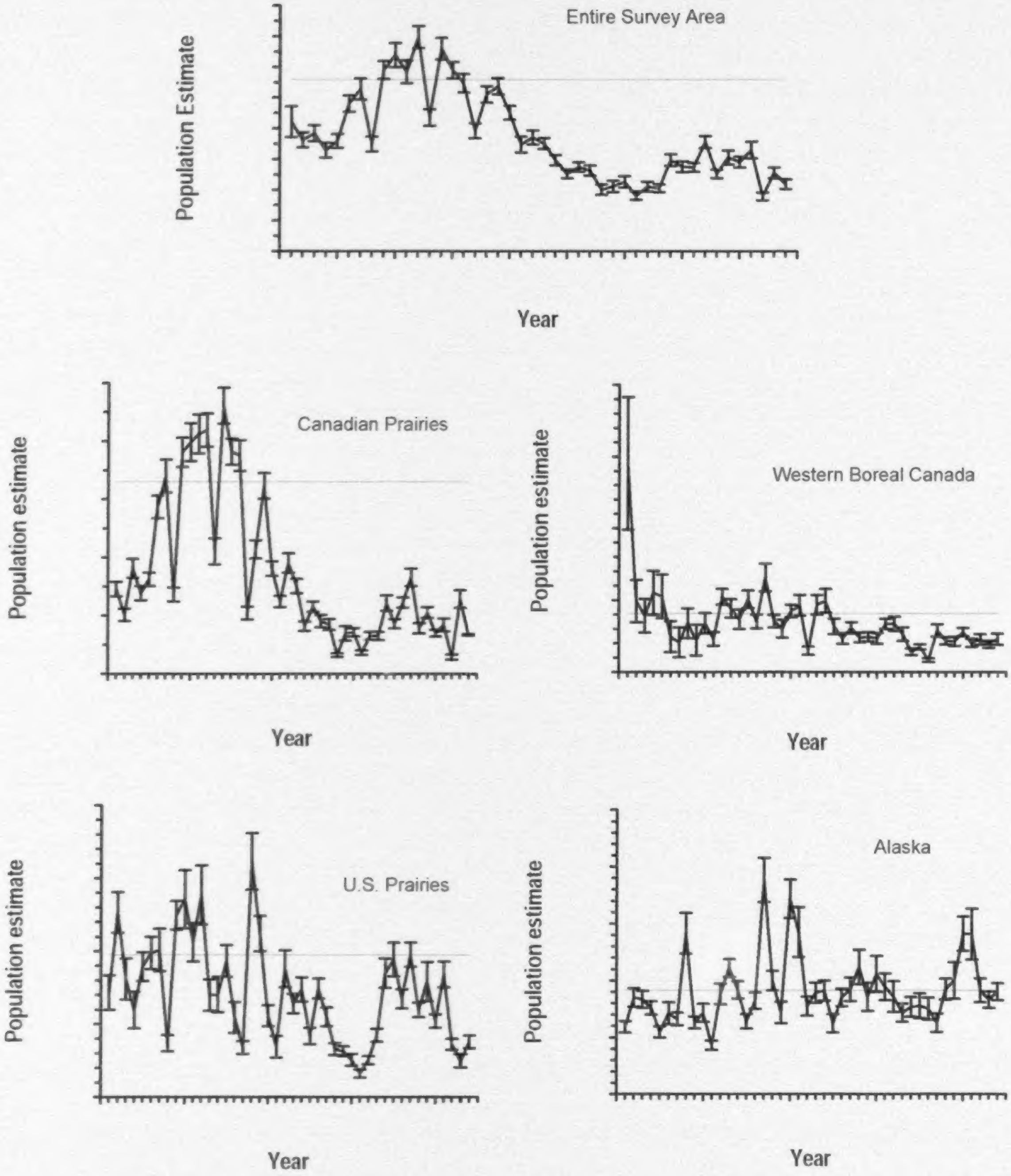


Figure 10. Northern Pintail Breeding Population in the Survey Area of the Waterfowl Breeding Population and Habitat Survey.

Estimates (± 1 SE) in the traditional survey area of the Waterfowl Breeding Population and Habitat Survey. The horizontal line represents the NAWMP population goal.

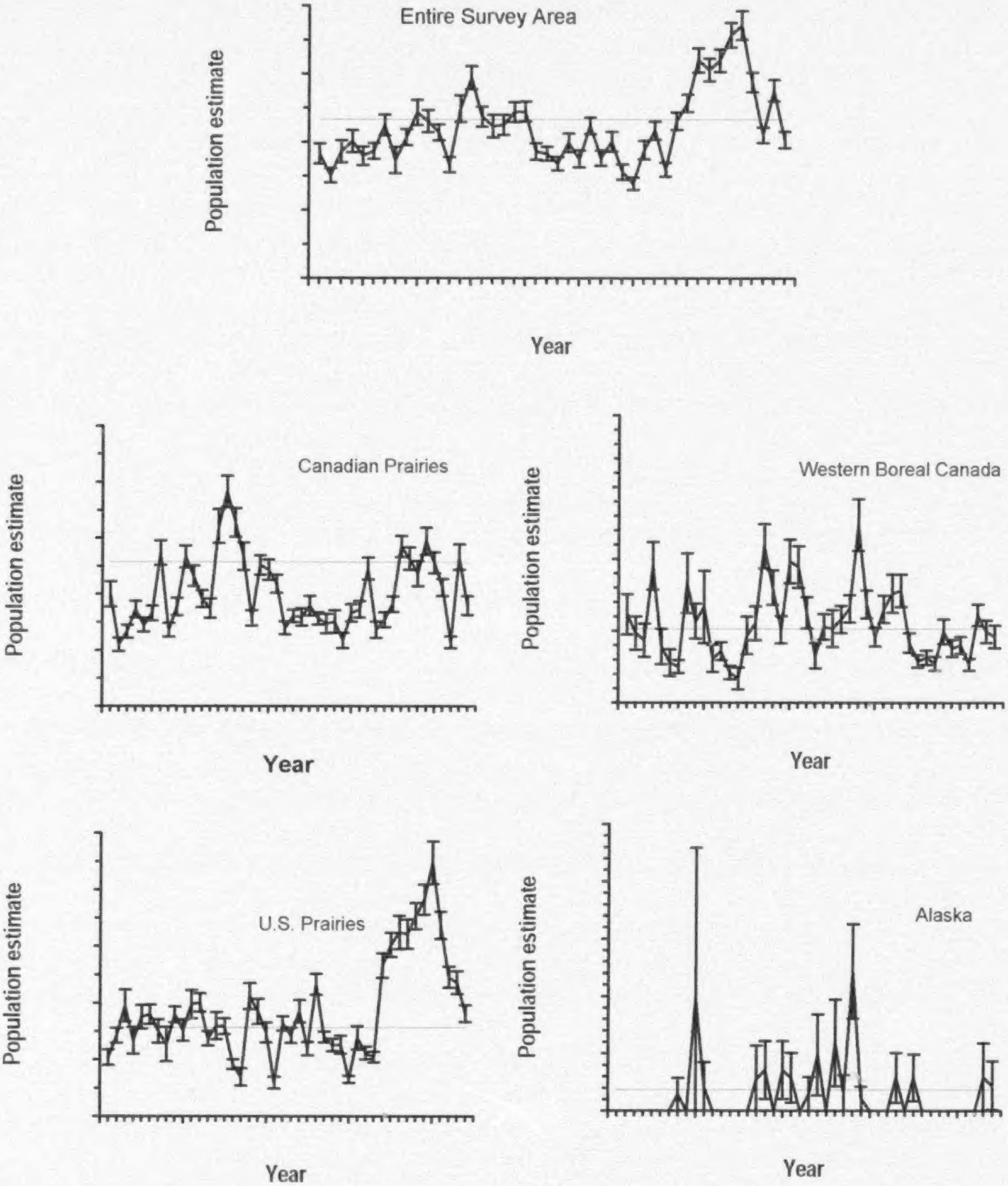


Figure 11. Blue-winged Teal Breeding Populations in the Survey Area of the Waterfowl Breeding Population and Habitat Survey.

Estimates (± 1 SE) in the traditional survey area of the Waterfowl Breeding Population and Habitat Survey. The horizontal line represents the NAWMP population goal.

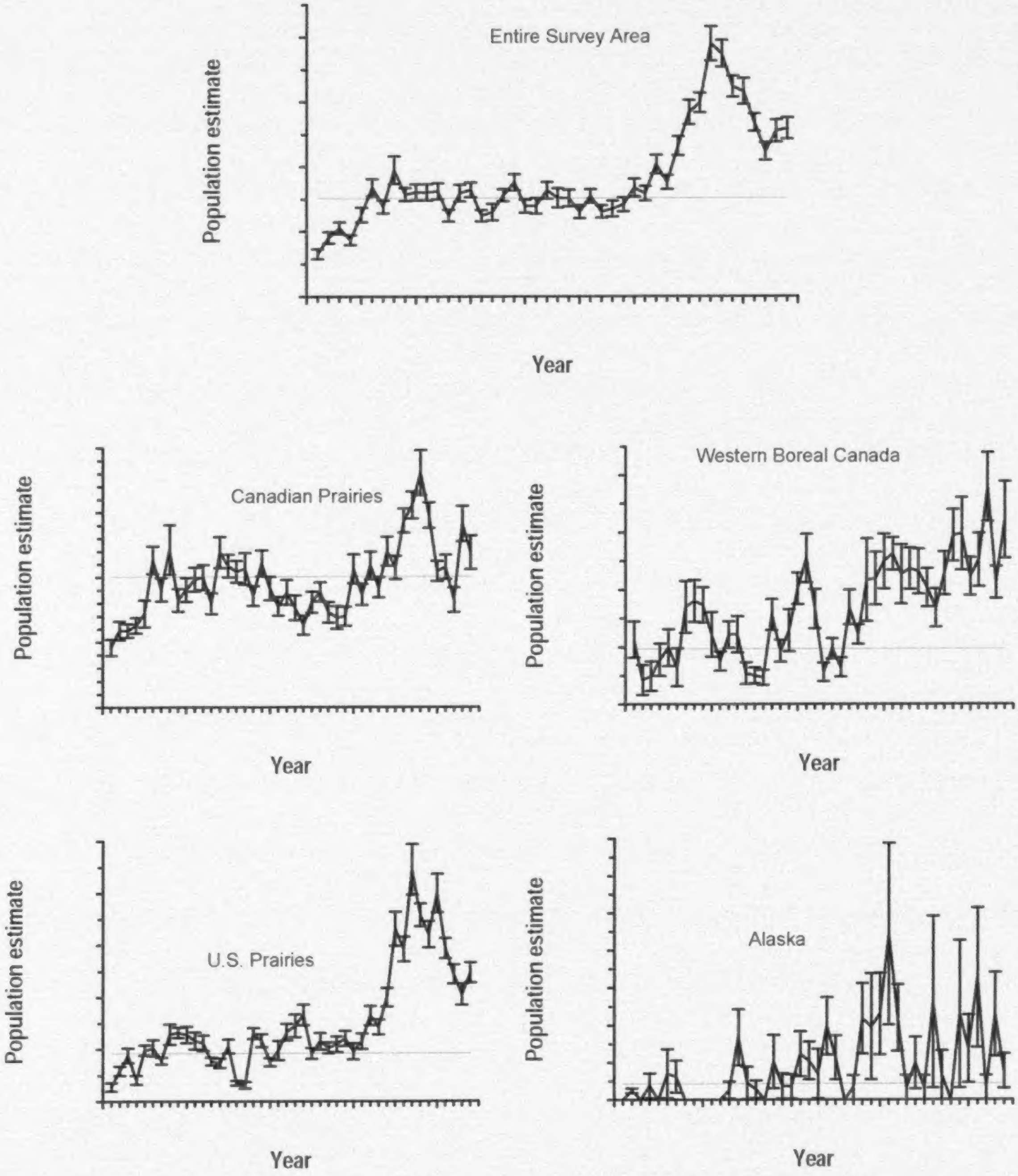


Figure 12. Gadwall Breeding Populations in the Survey Area of the Waterfowl Breeding Population and Habitat Survey.

Estimates (± 1 SE) in the traditional survey area of the Waterfowl Breeding Population and Habitat Survey. The horizontal line represents the NAWMP population goal.

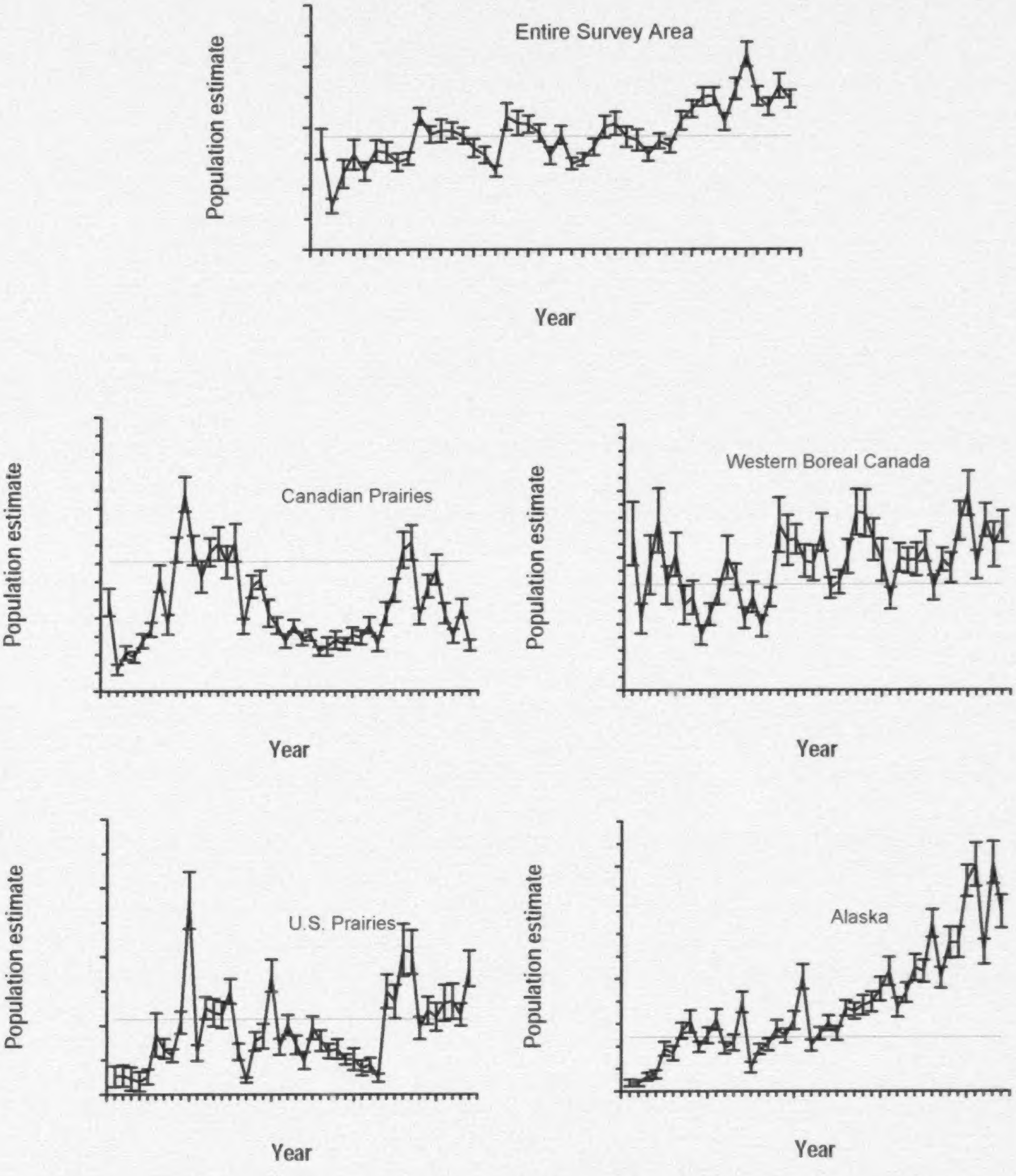


Figure 13. Green-winged Teal Breeding Populations in the Survey Area of the Waterfowl Breeding Population and Habitat Survey.

Estimates (± 1 SE) in the traditional survey area of the Waterfowl Breeding Population and Habitat Survey. The horizontal line represents the NAWMP population goal.

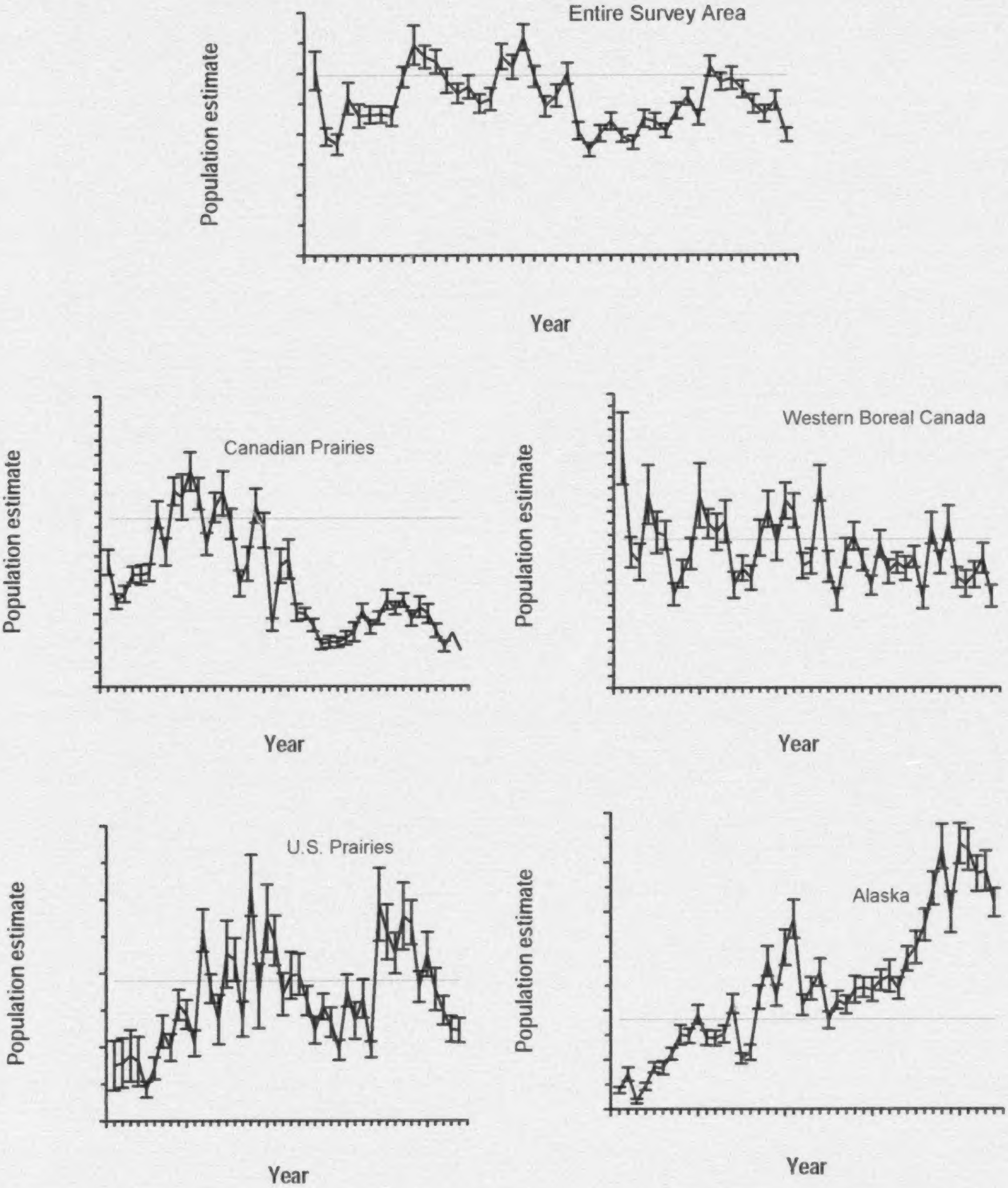


Figure 14. American Wigeon Breeding Populations in the Survey Area of the Waterfowl Breeding Population and Habitat Survey.

Estimates (± 1 SE) in the traditional survey area of the Waterfowl Breeding Population and Habitat Survey. The horizontal line represents the NAWMP population goal.

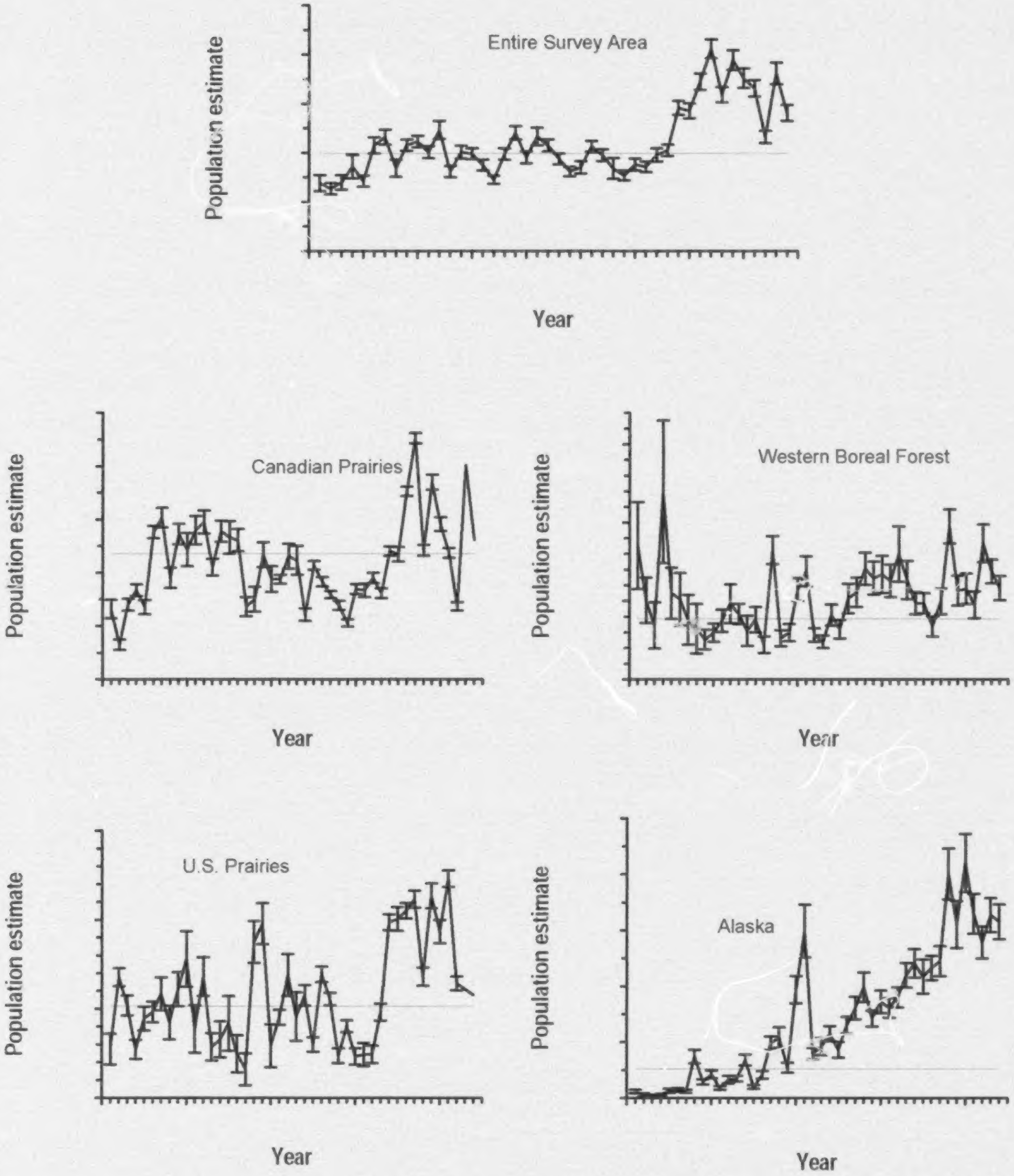


Figure 15. Northern Shoveler Breeding Populations in the Survey Area of the Waterfowl Breeding Population and Habitat Survey.

Estimates (± 1 SE) in the traditional survey area of the Waterfowl Breeding Population and Habitat Survey. The horizontal line represents the NAWMP population goal.

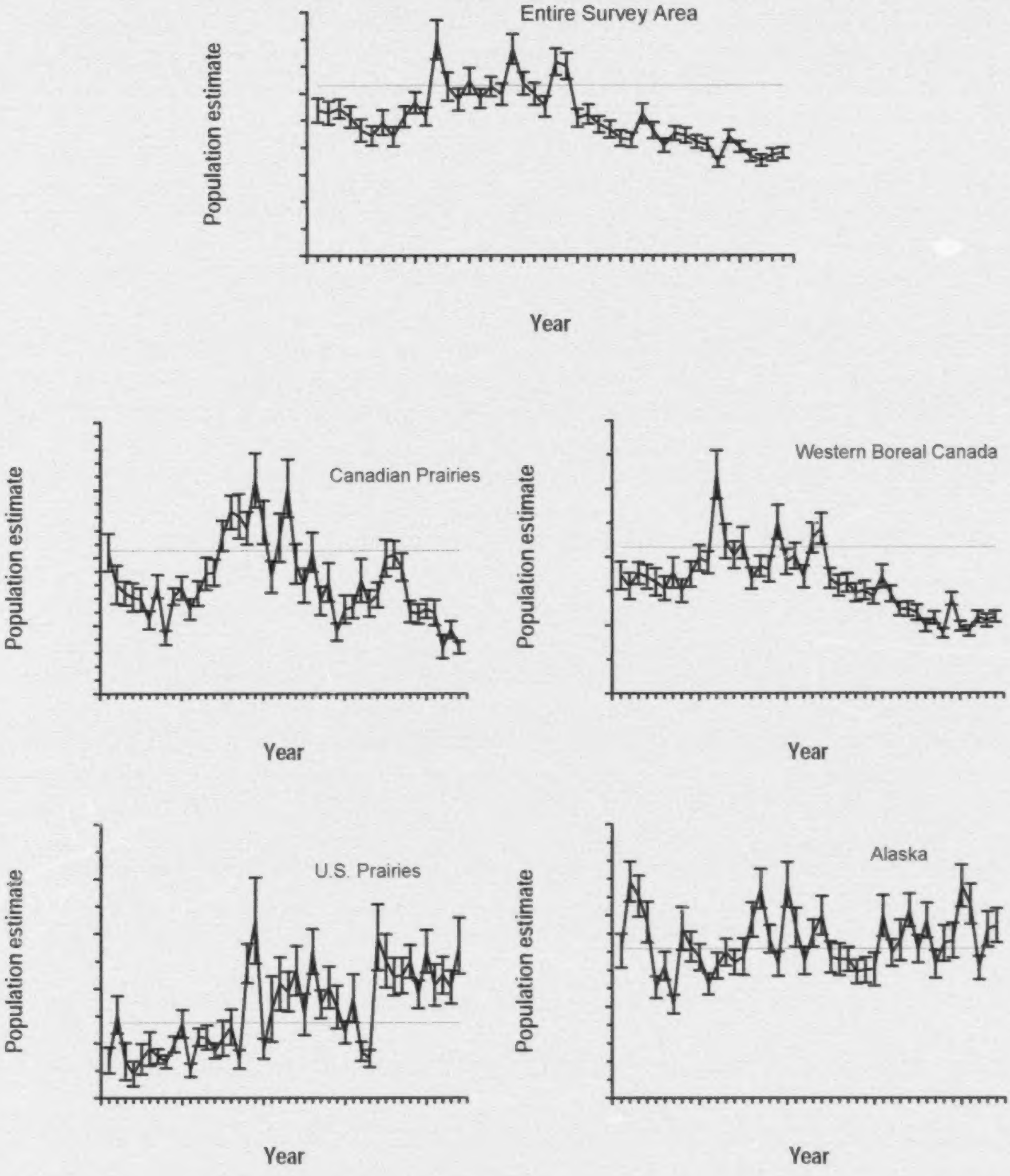


Figure 16. Scaup spp. Breeding Populations in the Survey Area of the Waterfowl Breeding Population and Habitat Survey.

Estimates (± 1 SE) in the traditional survey area of the Waterfowl Breeding Population and Habitat Survey. The horizontal line represents the NAWMP population goal.

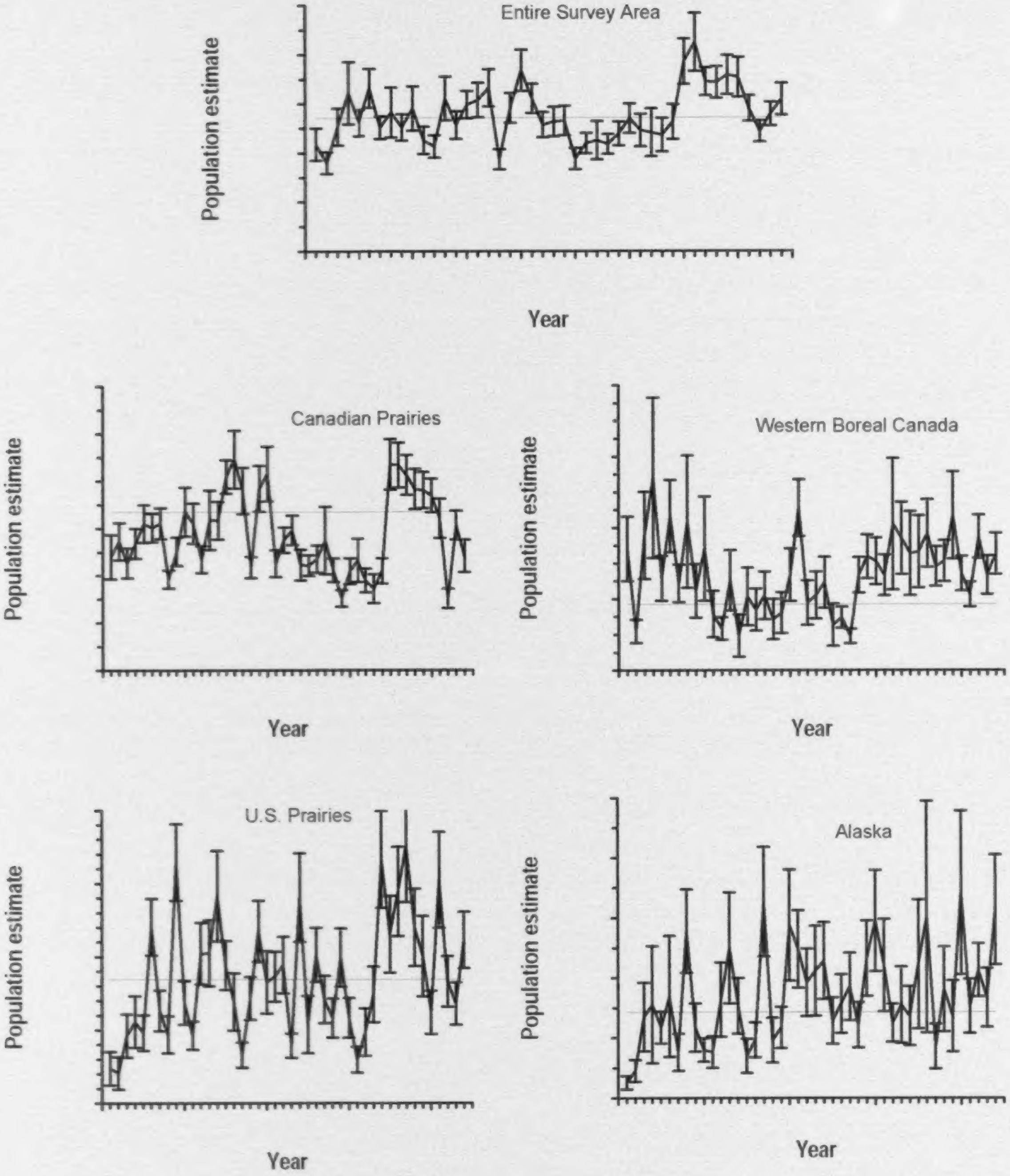


Figure 17. Canvasback Breeding Populations in the Survey Area of the Waterfowl Breeding Population and Habitat Survey.

Estimates (± 1 SE) in the traditional survey area of the Waterfowl Breeding Population and Habitat Survey. The horizontal line represents the NAWMP population goal.

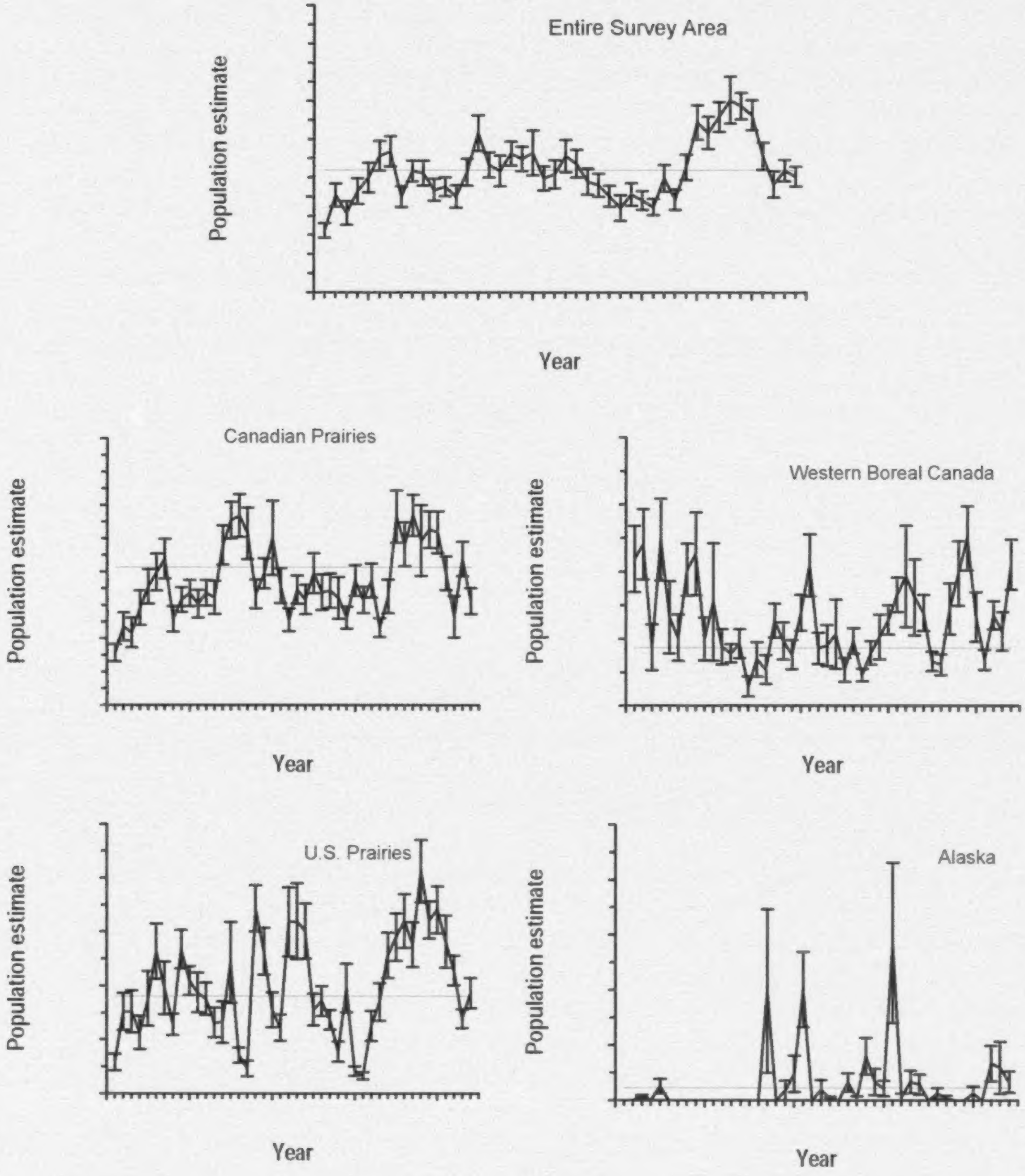


Figure 18. Redhead Breeding Populations in the Survey Area of the Waterfowl Breeding Population and Habitat Survey.

Estimates (± 1 SE) in the traditional survey area of the Waterfowl Breeding Population and Habitat Survey. The horizontal line represents the NAWMP population goal.

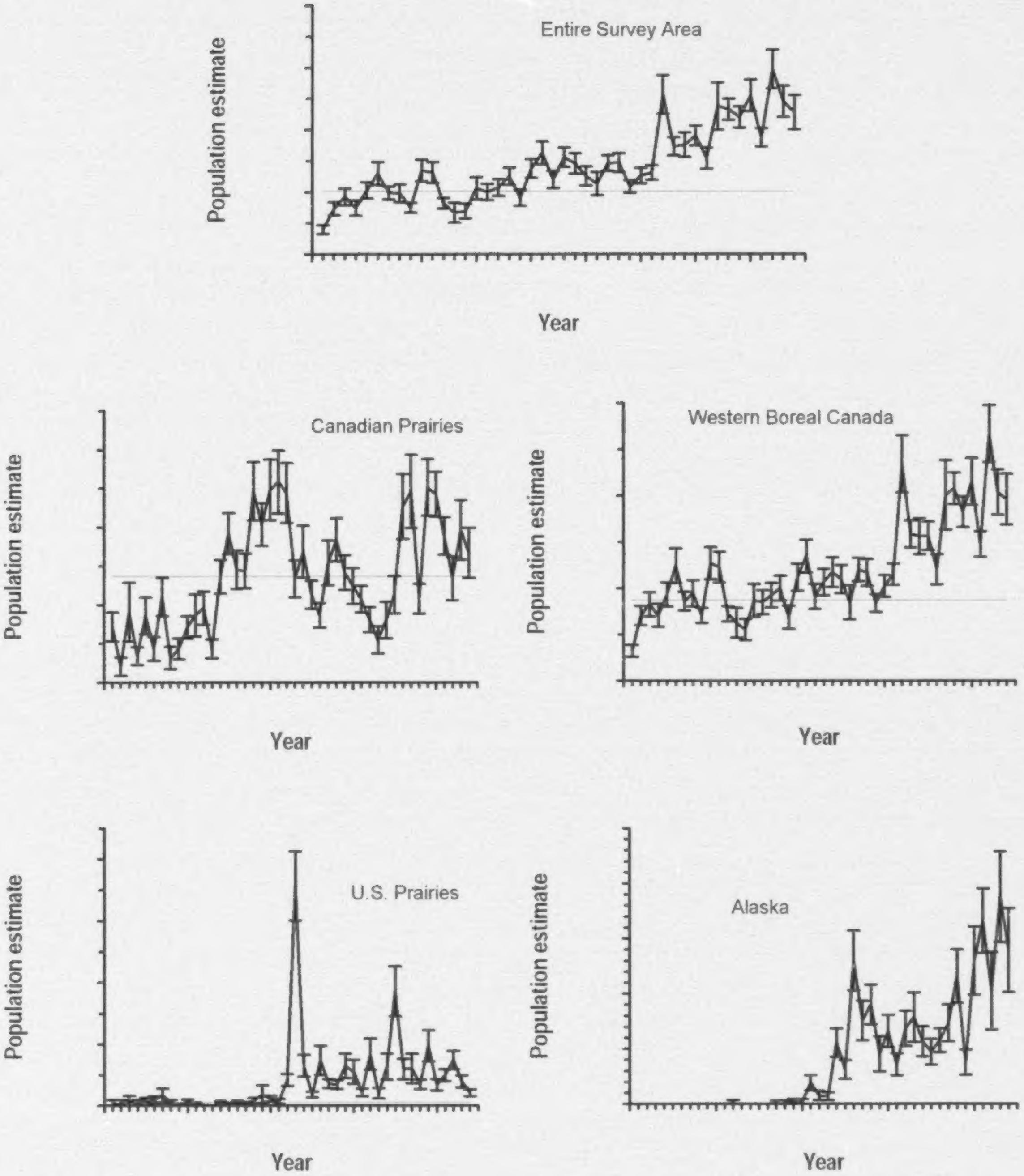


Figure 19. Ring-necked Duck Breeding Populations in the Survey Area of the Waterfowl Breeding Population and Habitat Survey.

Estimates (± 1 SE) in the traditional survey area of the Waterfowl Breeding Population and Habitat Survey. The horizontal line represents the NAWMP population goal.

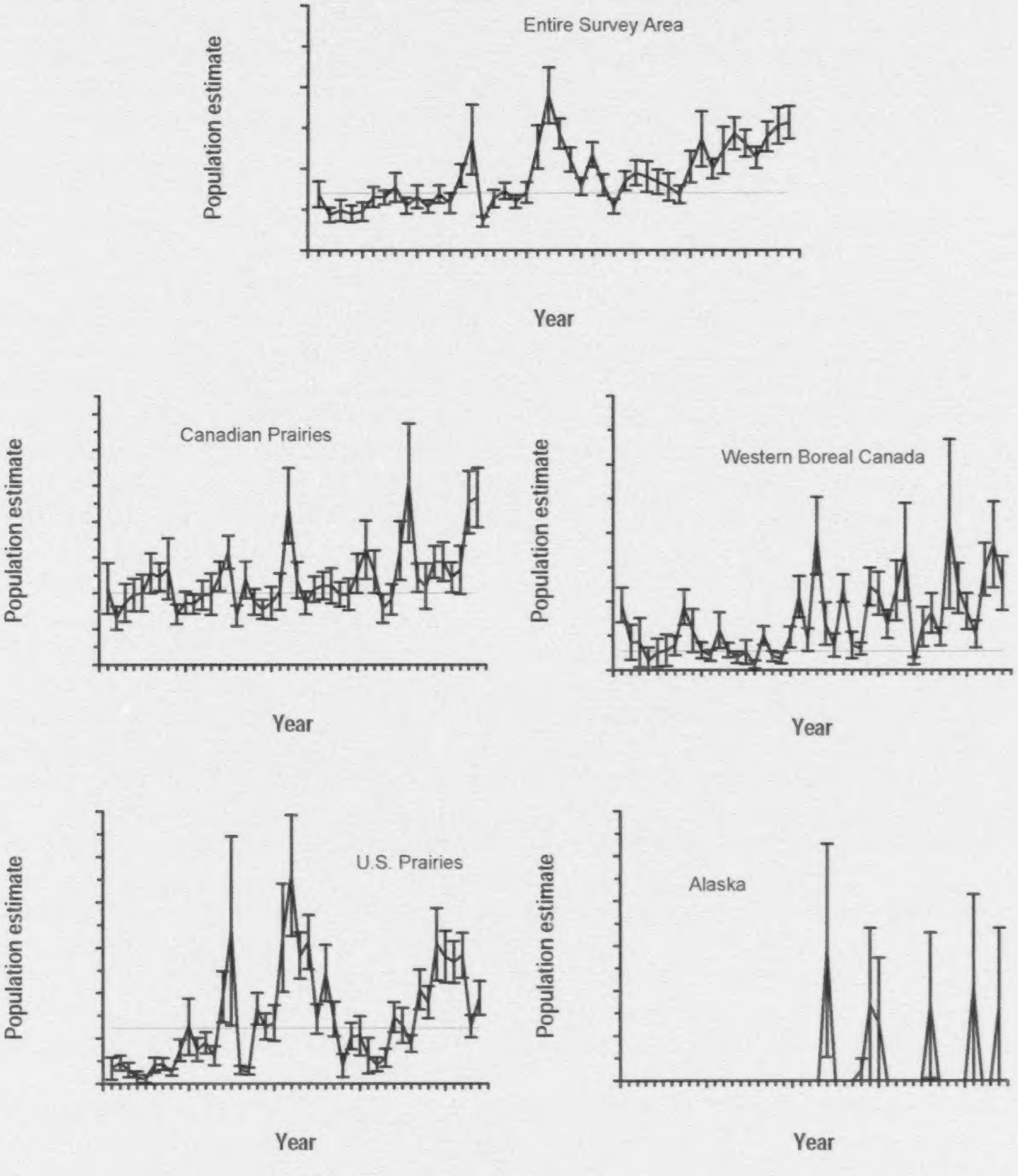


Figure 20. Ruddy Duck Breeding Populations in the Survey Area of the Waterfowl Breeding Population and Habitat Survey.

Estimates (± 1 SE) in the traditional survey area of the Waterfowl Breeding Population and Habitat Survey. The horizontal line represents the NAWMP population goal.

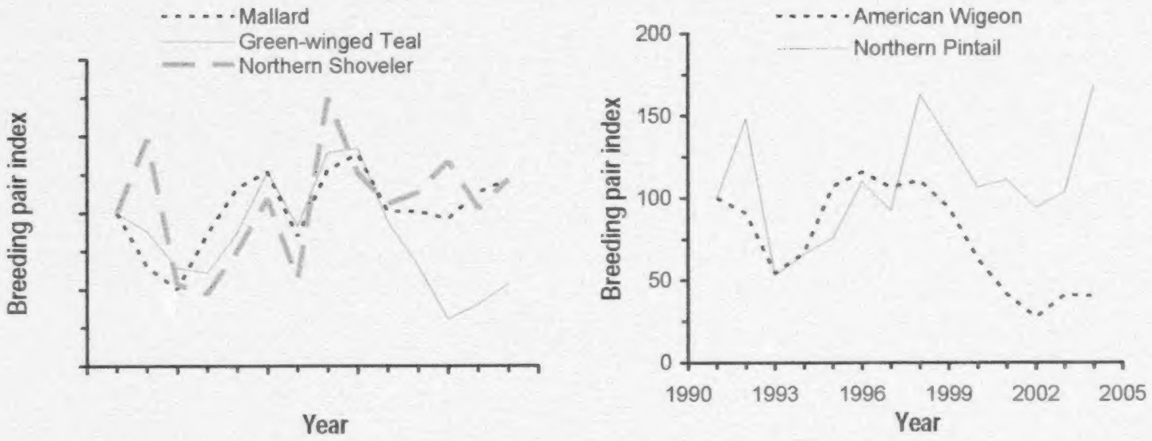


Figure 21. Common Dabbling Ducks in the Southern Yukon.

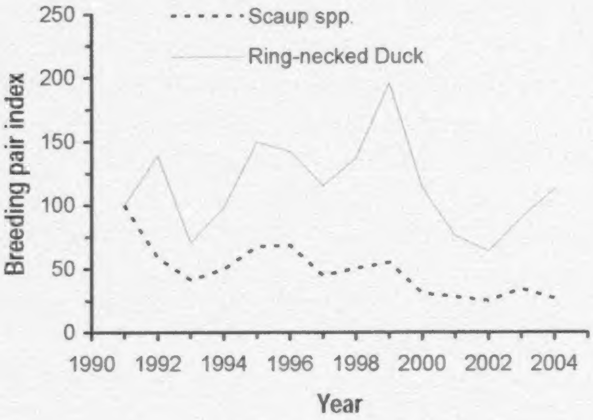


Figure 22. Common Diving Ducks in the Southern Yukon.
Trends in indicated breeding pairs (Hawkings and Hughes, 2004).

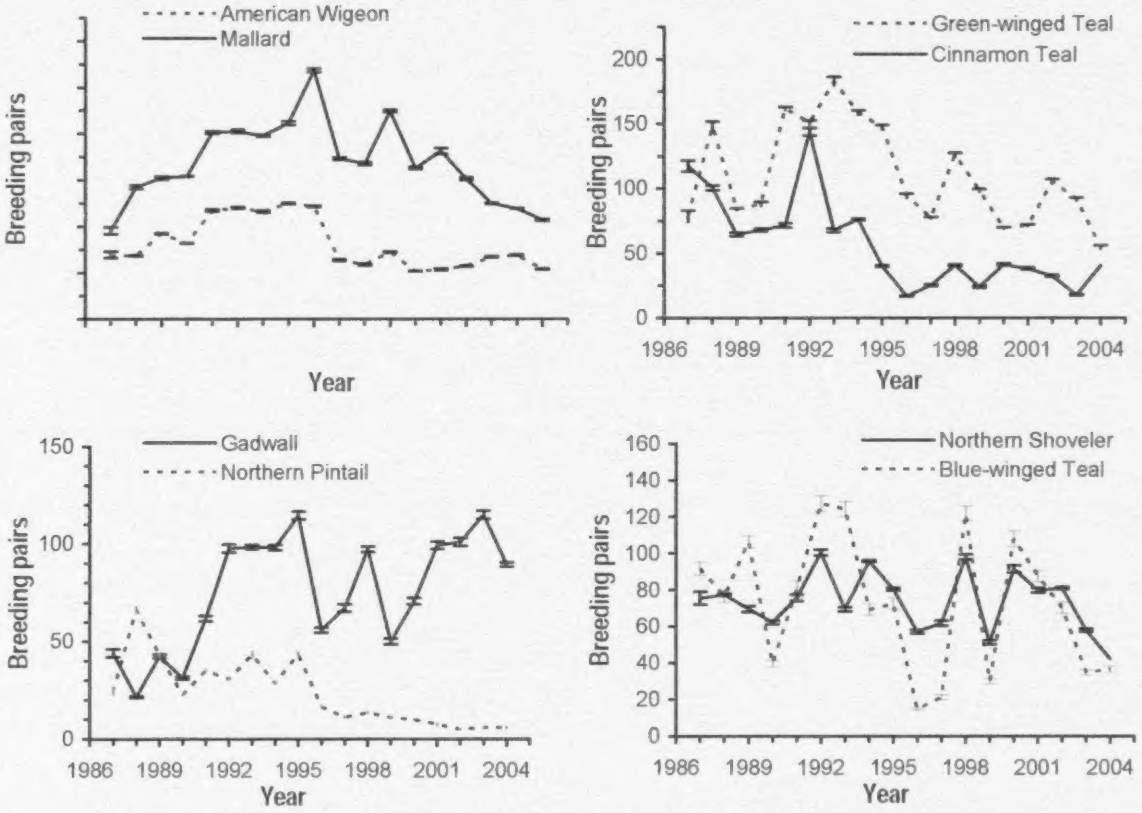


Figure 23. Common Inland Dabbling Ducks in the Interior of British Columbia

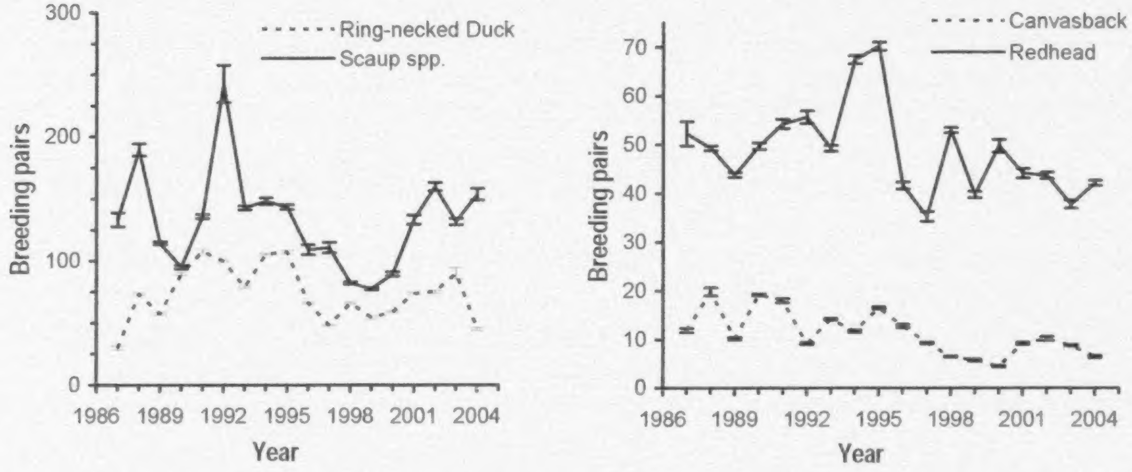


Figure 24. Common Inland Diving Ducks in the Interior of British Columbia.

Mean number (± 1 SE) of breeding pairs as seen on roadside surveys in the interior of British Columbia (A. Breault and P. Watts, CWS)

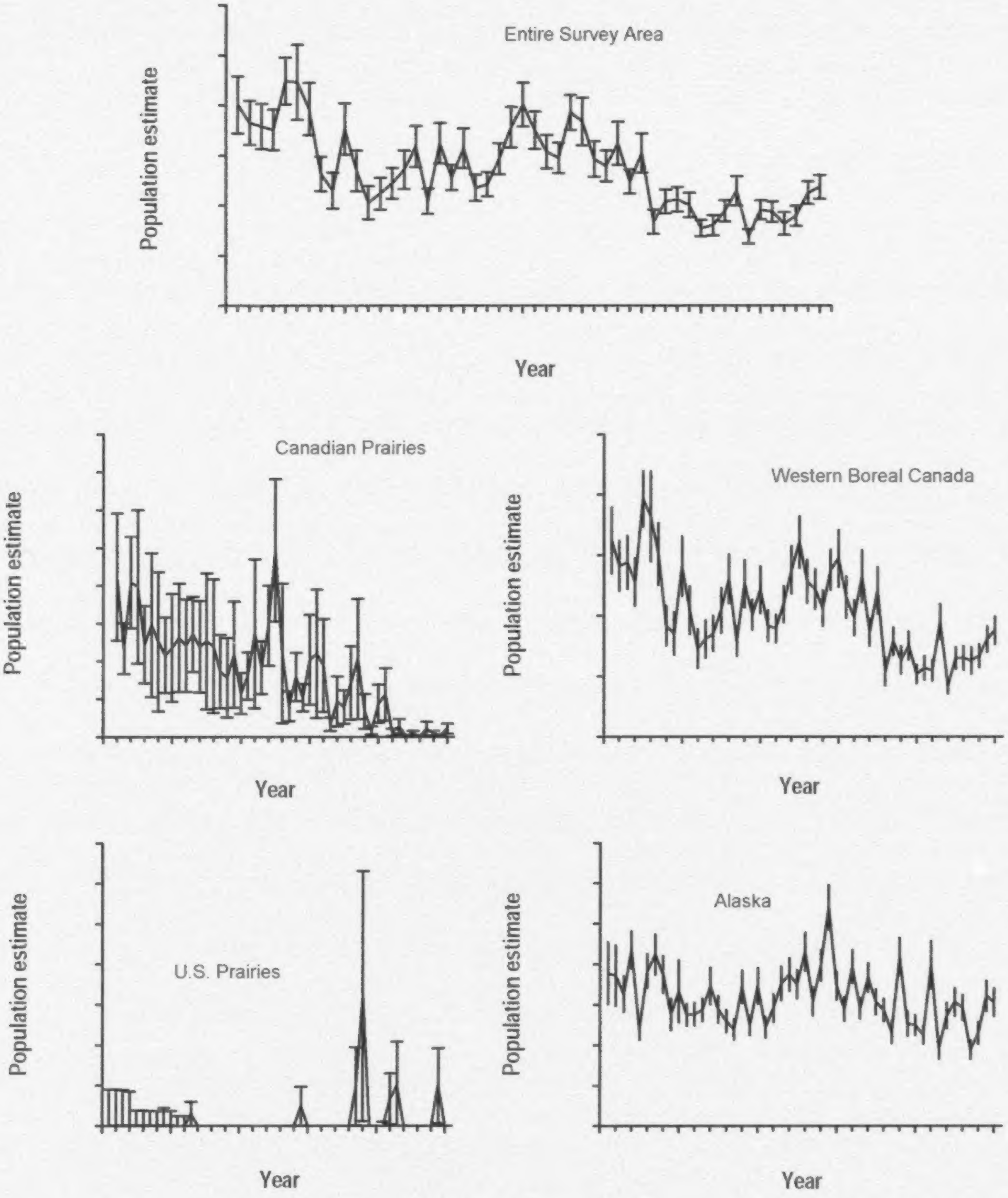


Figure 25. Scoter spp. Breeding Population Estimates in the Survey Area of the Waterfowl Breeding Population and Habitat Survey.

Breeding population estimates (± 1 SE) in the traditional survey area of the Waterfowl Breeding Population and Habitat Survey.

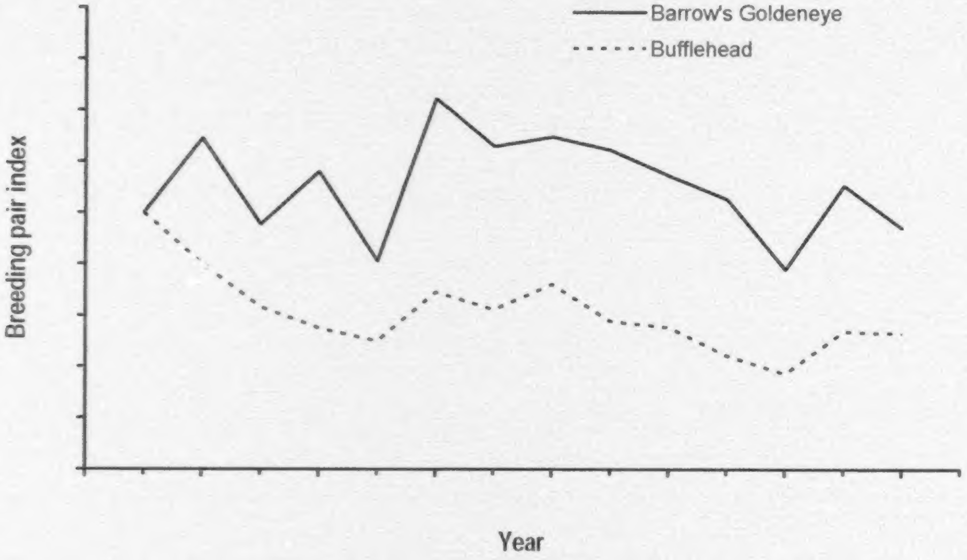


Figure 26. Common Sea Ducks of the Southern Yukon.

Trends in indicated breeding pairs (Hawkings and Hughes,2004)

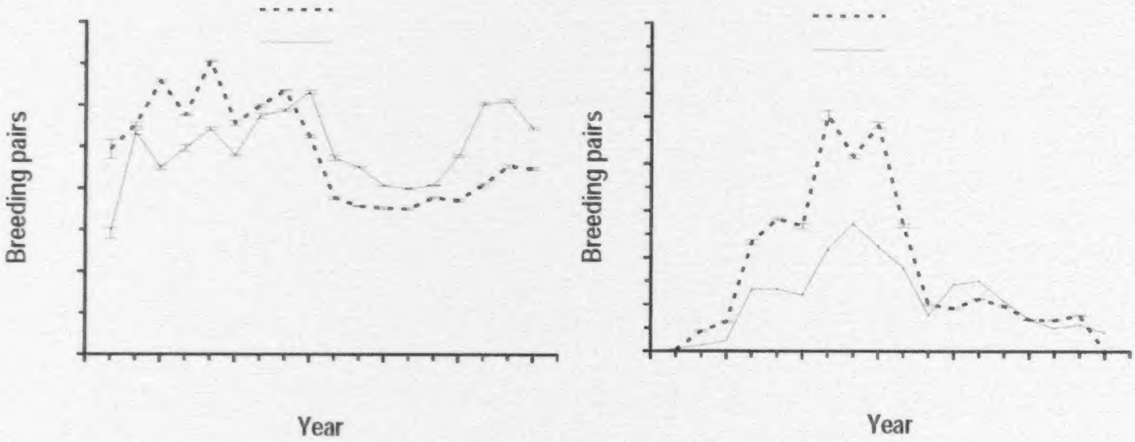
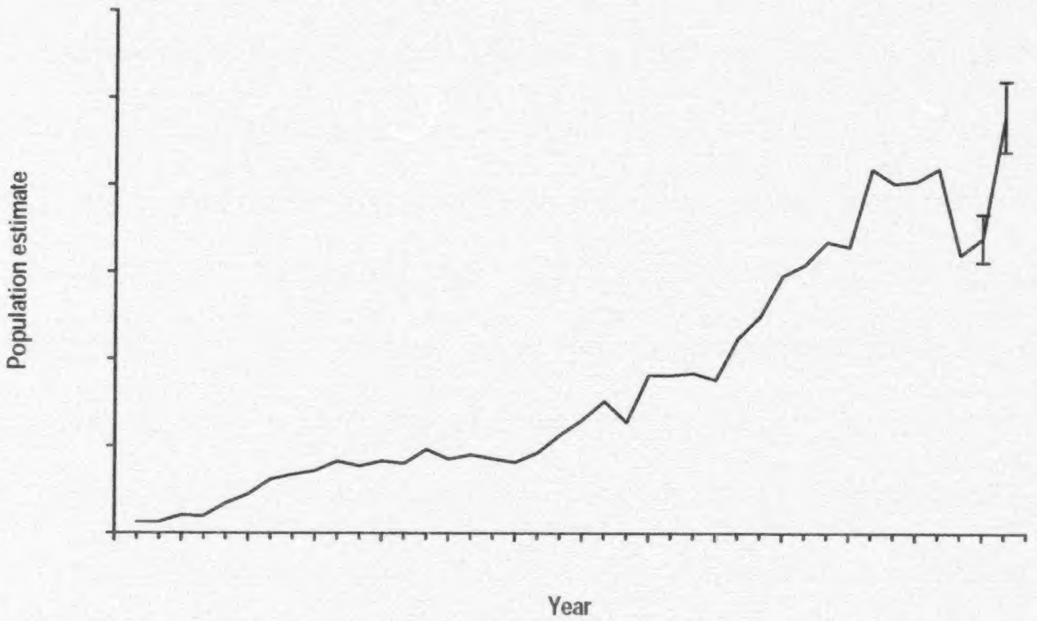


Figure 27. Common Sea Ducks in the Interior of British Columbia.

Mean number (± 1 SE) of breeding pairs as seen on roadside surveys in the interior of British Columbia (A. Breault and P. Watts, CWS).

Figure 28. Greater Snow Geese Spring Population in the St. Lawrence River Valley.



A correction factor was applied to the 1998 and the 2000 estimates to account for greater dispersal of geese. Geese were also dispersed in 2002, but no correction factor has been applied.

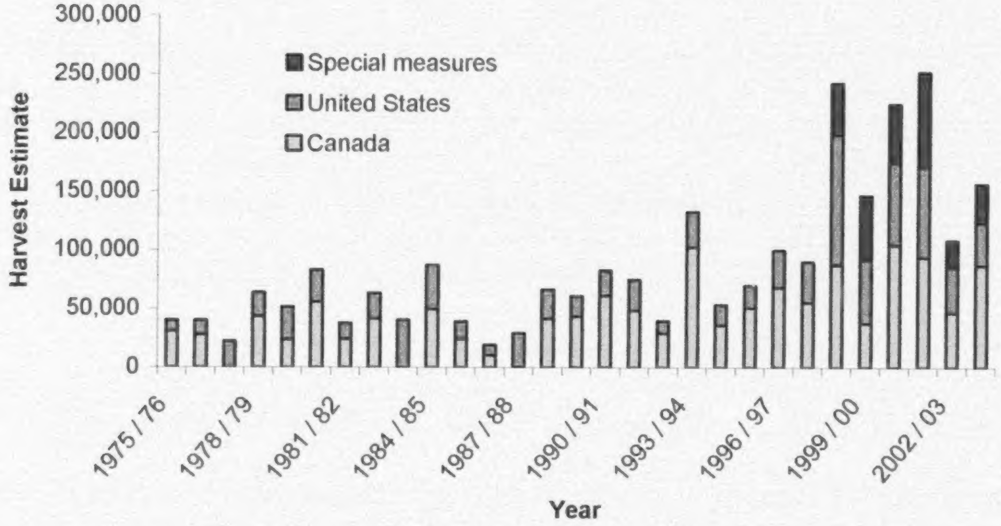
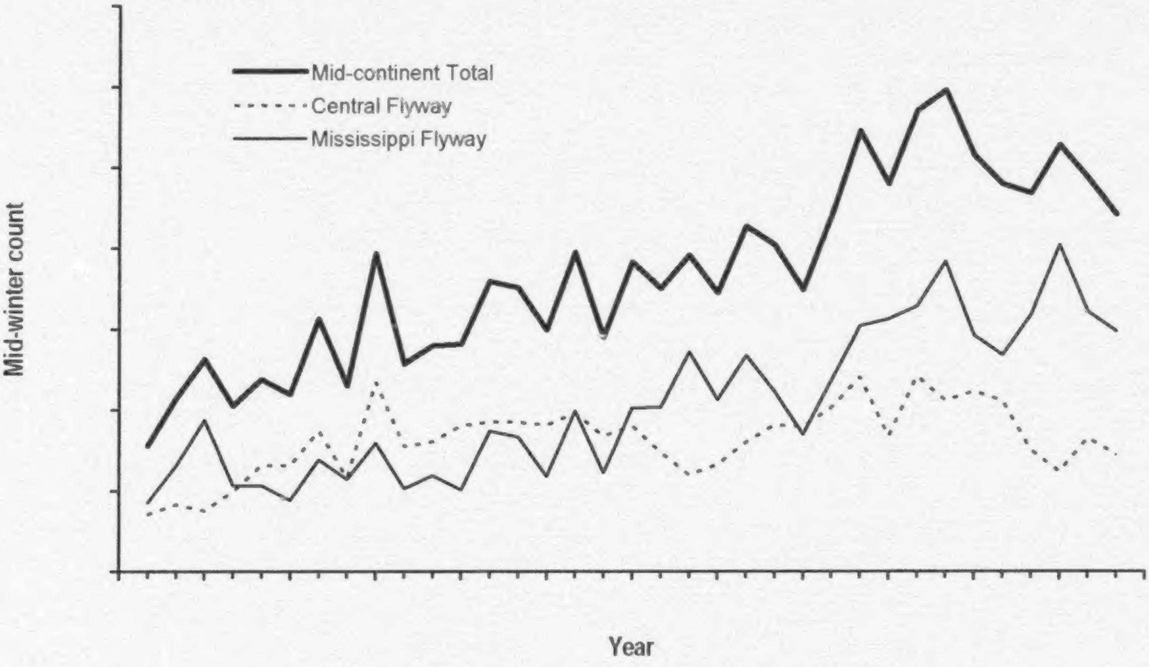


Figure 29. Harvest of Greater Snow Geese during the fall hunting season, and beginning in the spring of 1999, also includes the harvest during special conservation measures.

Data presented for the United States beginning in 1999 was based on the new "Harvest Information Program", and is not directly comparable to the estimates of earlier years.

Figure 30. Mid-continent Lesser Snow Geese Populations in Mid-winter.



Counts include some Ross' Geese. (Fronczak, 2004)

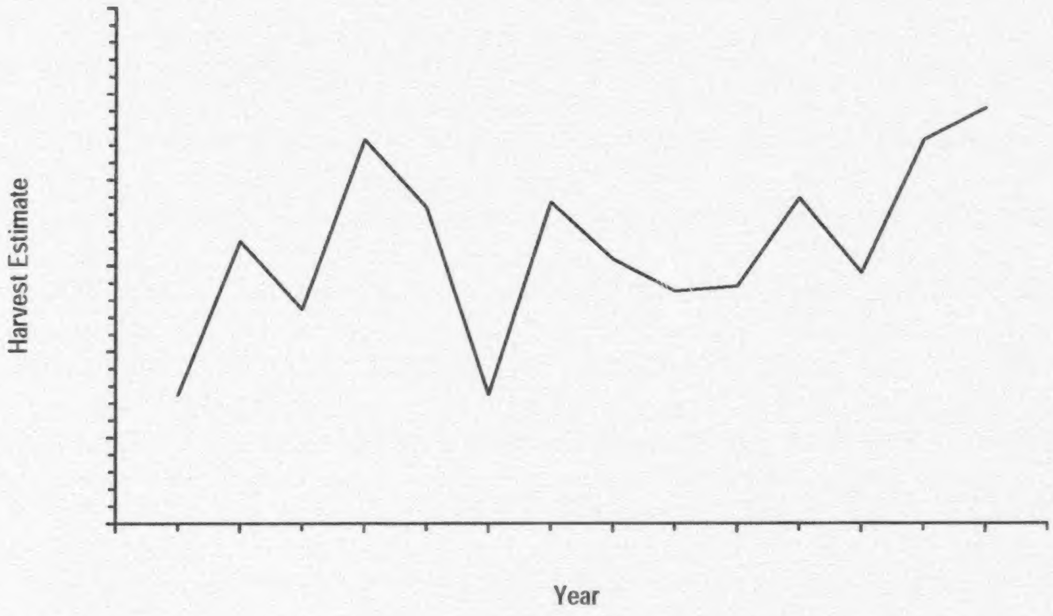


Figure 31. Lesser Snow Geese Harvest Estimates for the Wrangel Island Population.

Estimates include adjustment for cripple loss (A. Breault, CWS, unpublished).

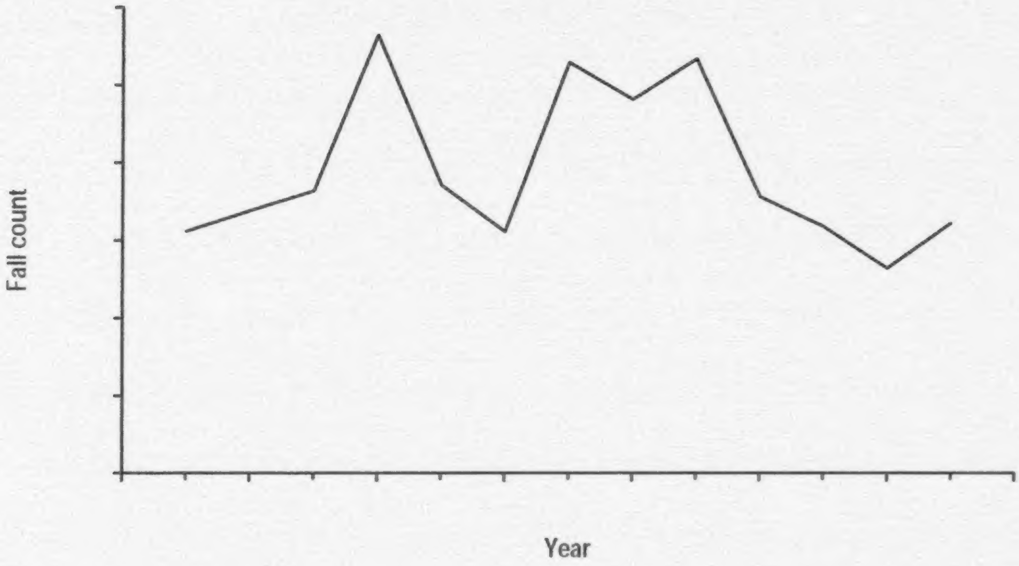
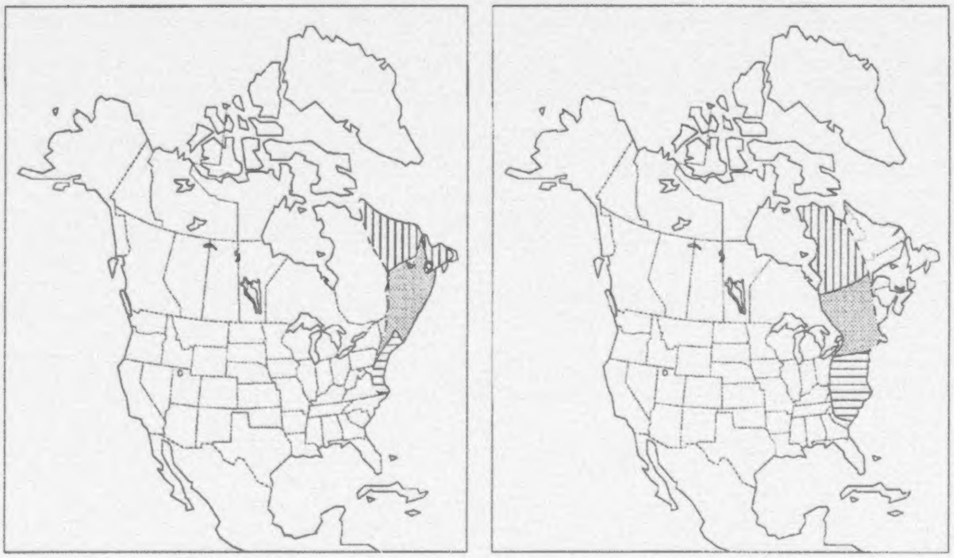


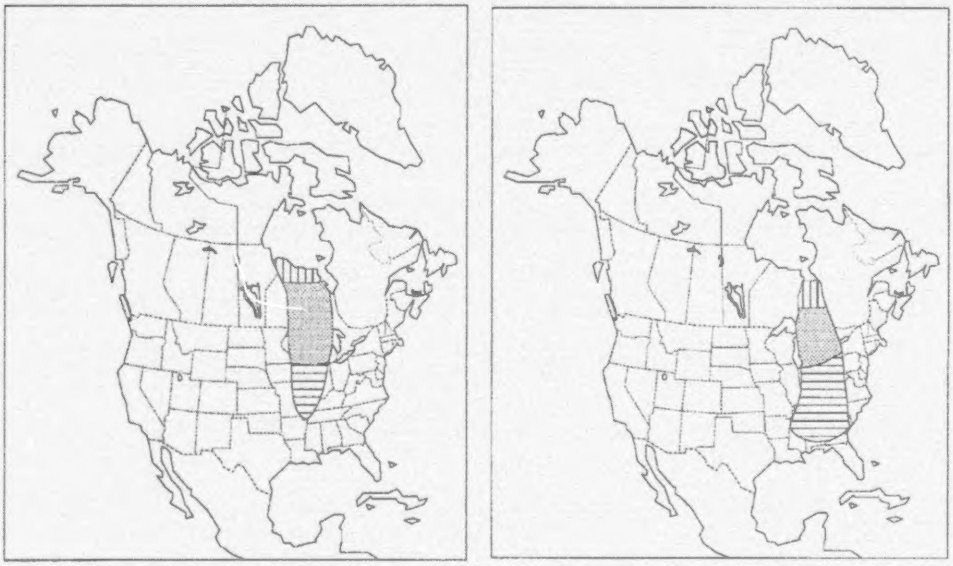
Figure 32. Greater White-fronted Geese of the Mid-Continent.

Fall survey on staging areas in Saskatchewan and Alberta (D. Nieman et al., 2004).



North Atlantic

Atlantic



Mississippi Valley

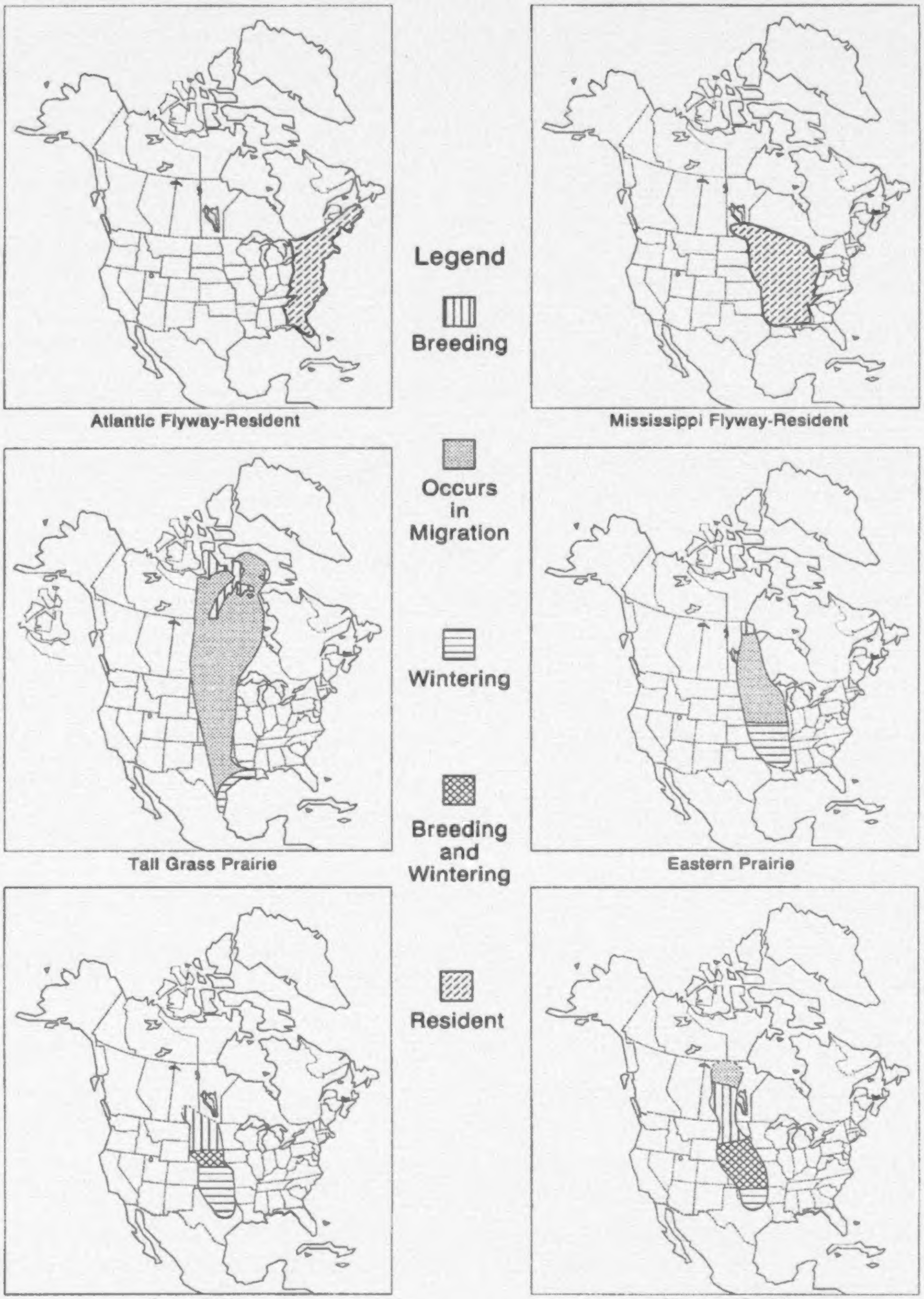
Southern James Bay

Legend

▥ Breeding ▒ Occurs in migration ▤ Wintering ▩ Breeding & wintering ▨ Resident

(from Bellrose 1976, Palmer 1976, Rusch et al. 1996, USFWS 1996)

Figure 33 a. Canada Goose Populations in North America: NAP, AP, MVP and SJBP.


Legend
▥ Breeding
▩ Occurs in Migration
▤ Wintering
▦ Breeding and Wintering
▨ Resident

Atlantic Flyway-Resident

Mississippi Flyway-Resident

Tall Grass Prairie

Eastern Prairie

Great Plains

Western Prairie

Figure 33 b. Canada Goose Populations in North America: AFRP, MFRP, TGPP, EPP, GPP and WPP.

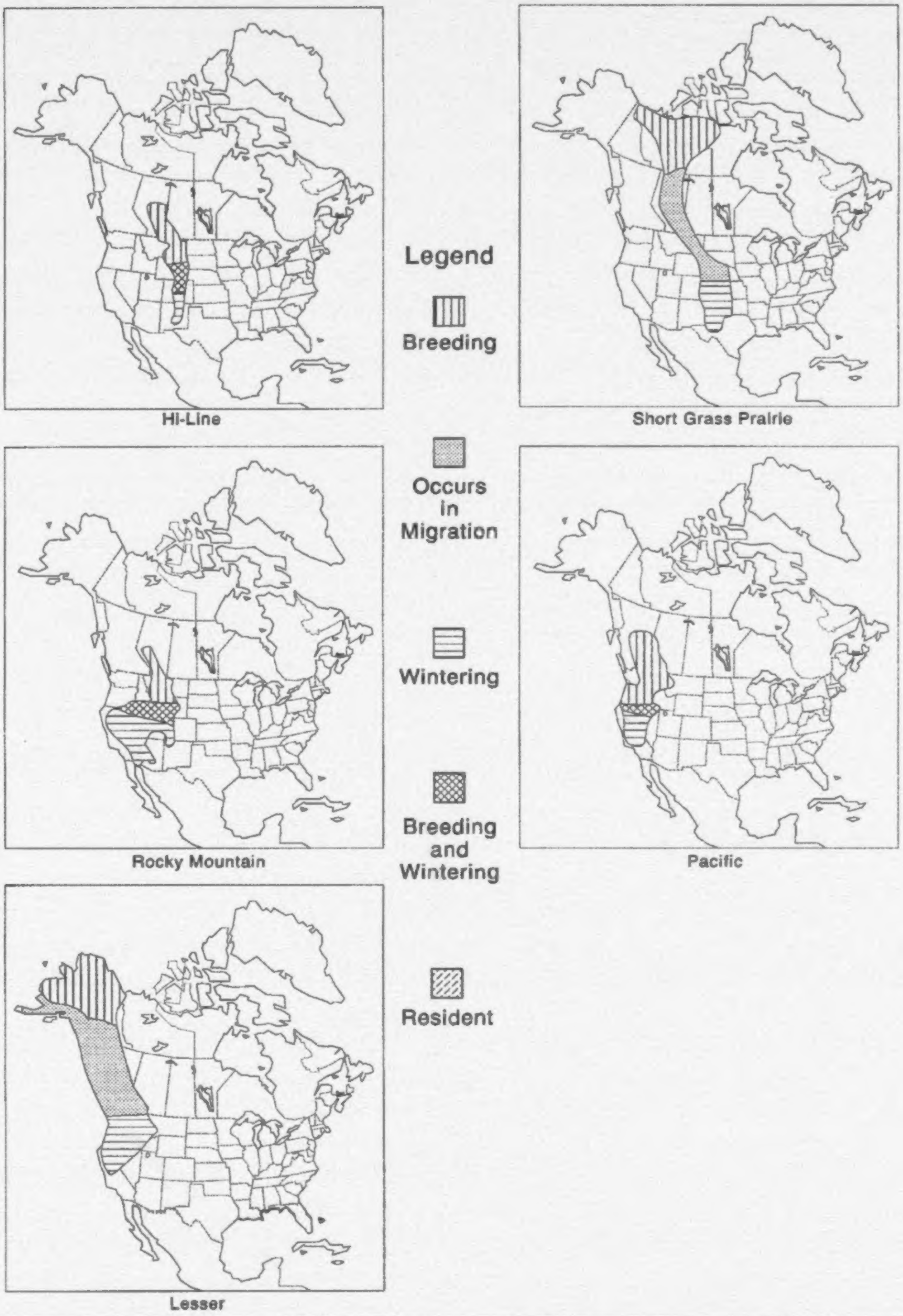

Legend
Breeding
Occurs in Migration
Wintering
Breeding and Wintering
Resident
Hi-Line
Short Grass Prairie
Rocky Mountain
Pacific
Lesser

Figure 33 c. Canada Goose Populations in North America: HLP, SGPP, RMP, PP and LP.

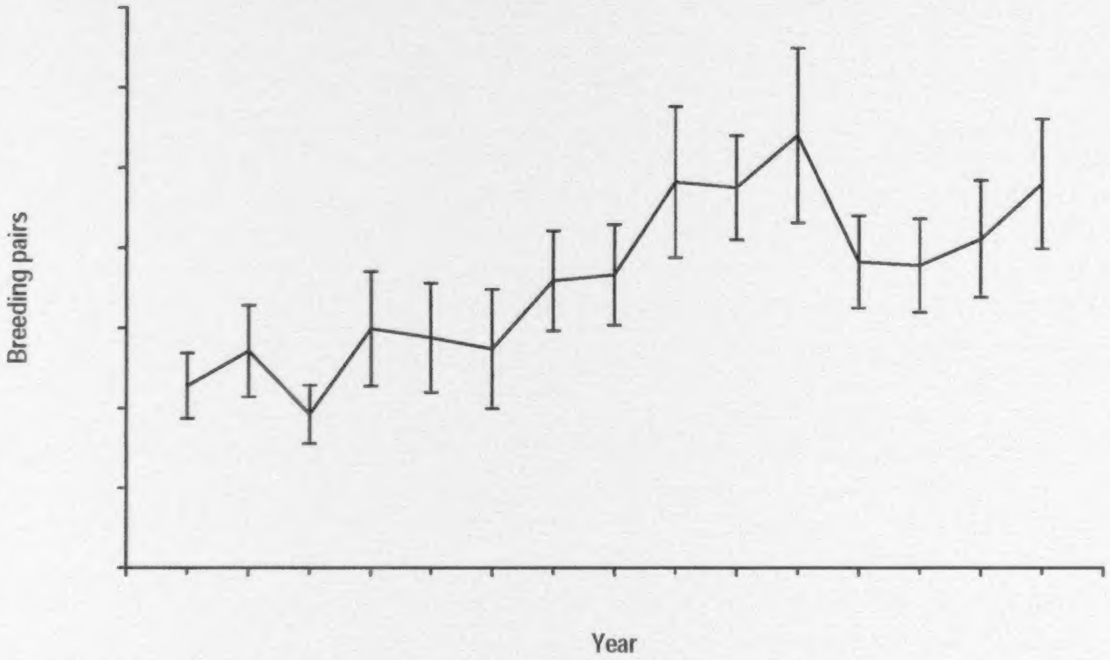


Figure 34. Breeding Pairs of the North Atlantic Population Canada Geese in stratum 2 of the Black Duck Breeding Ground Survey area (Figure 1).

Breeding pairs ± 1SE

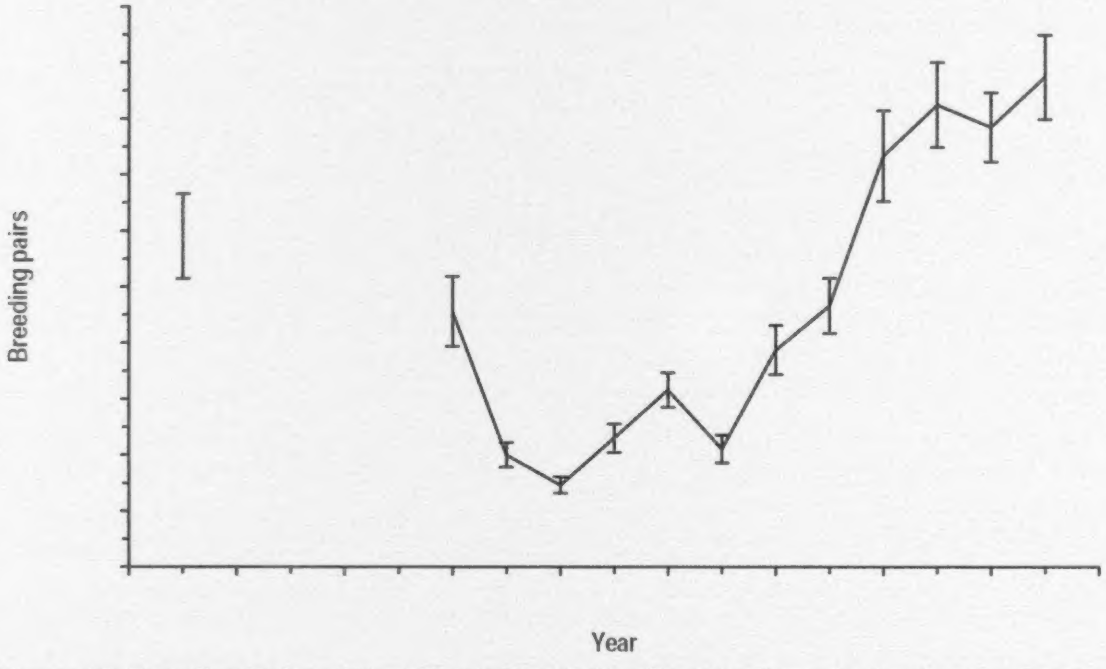


Figure 35. Breeding Pairs of the Atlantic Population Canada Geese in the Ungava Peninsula of northern Quebec.

Breeding pairs ± 1SE (Harvey and Rodrigue, 2004) . No surveys were conducted from 1989-1992.

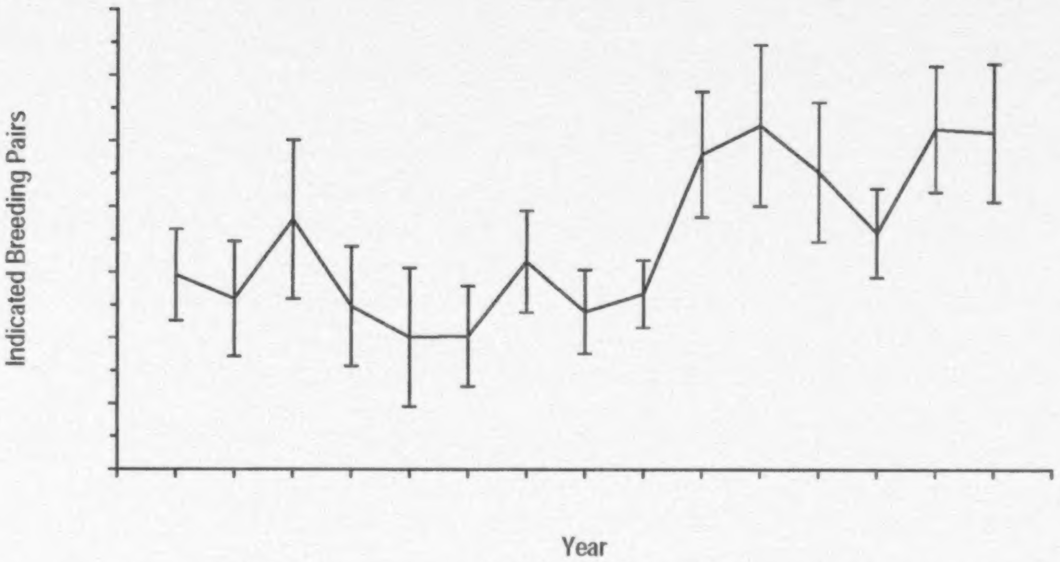


Figure 36. Breeding Pairs of the Atlantic Population Canada Geese in Quebec in the Black Duck Breeding Ground Survey Area.

Population estimates of breeding pairs (±1SE) refer only to that part of Quebec covered by the BDJV survey (see Figure 1), (Bordage et Lepage, 2004).

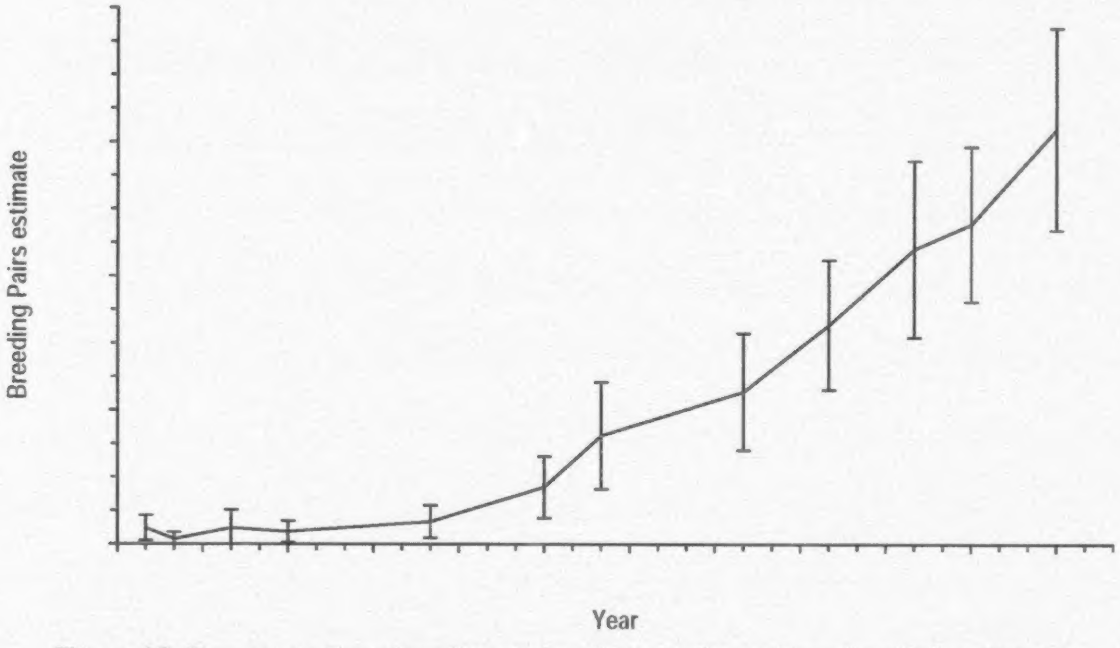


Figure 37. Temperate Breeding Population Canada Geese Breeding Pair estimates.

±95% C.I. Surveys were not conducted in every year (Hughes and North, CWS, pers. comm.)

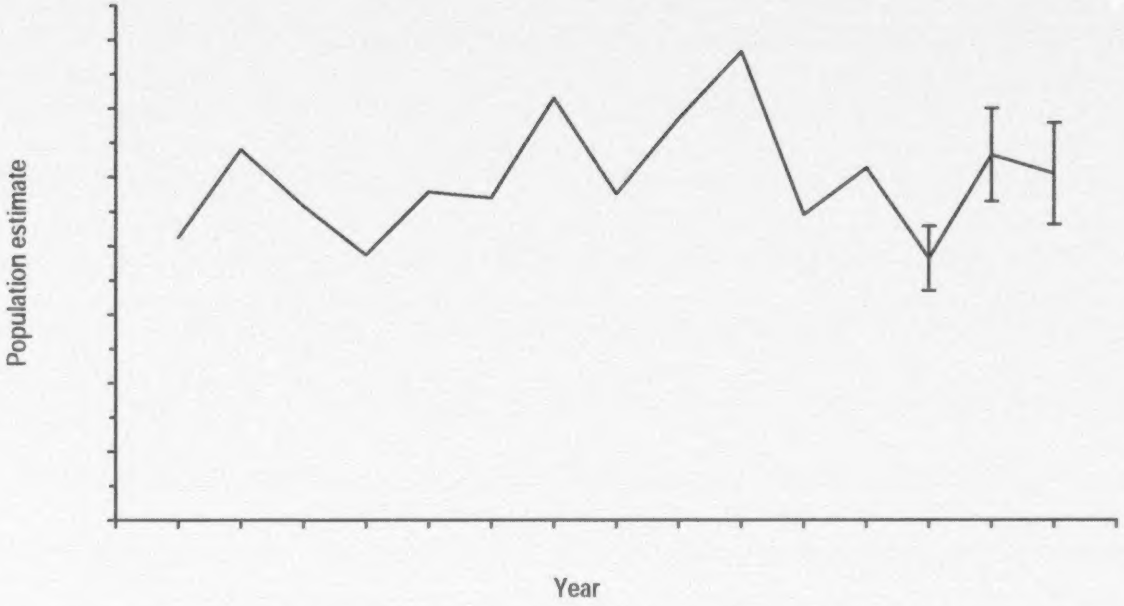


Figure 38. Southern James Bay Population Canada Geese spring estimates.

2002-2004 data, ± 1 SE. (Walton and Hughes, 2004a)

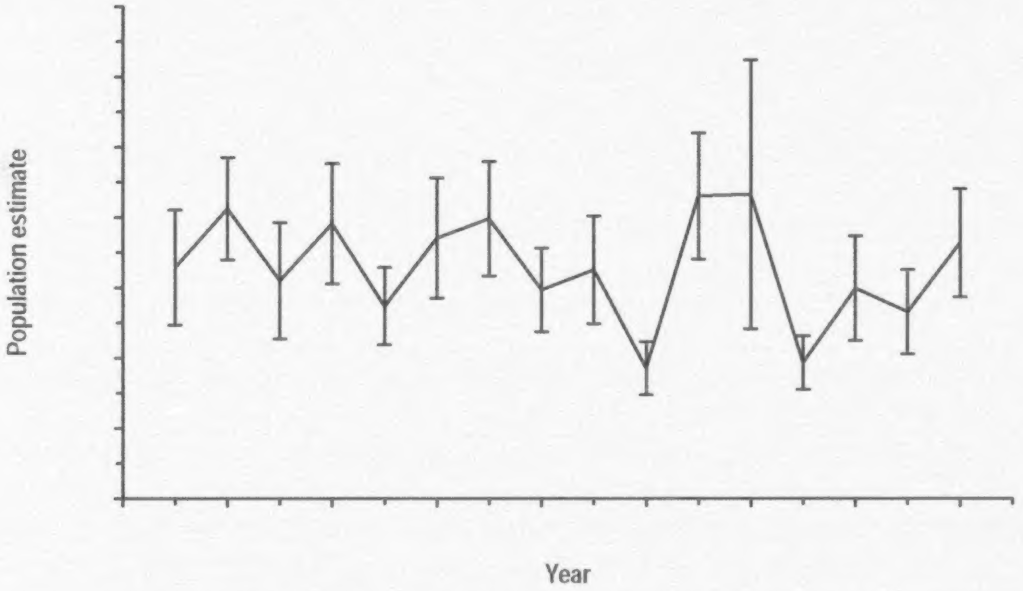


Figure 39. Canada Geese; Mississippi Valley Population spring estimates.

Population estimates ± 95% CI (Walton and Hughes 2004b)

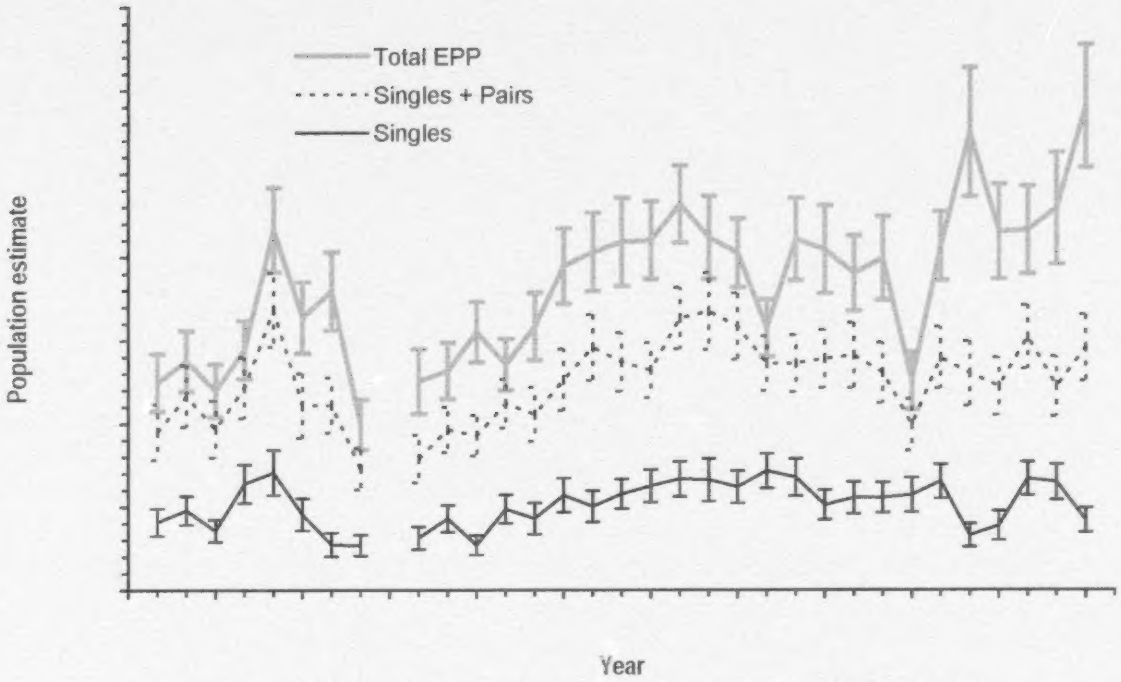


Figure 40. Eastern Prairie Population Canada Geese spring estimates.

±95% C.I. No survey was conducted in 1980. (Raedeke et al., 2004)

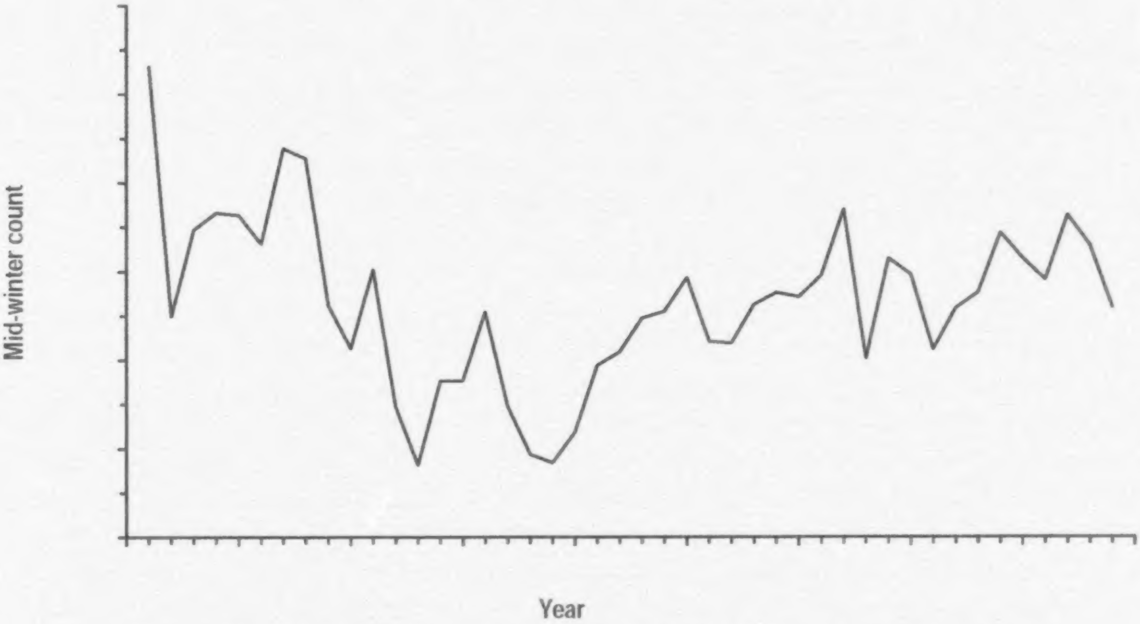


Figure 41. Mid-winter inventory of Atlantic Brant in the Atlantic Flyway.

(Serie and Raftovich, 2004)

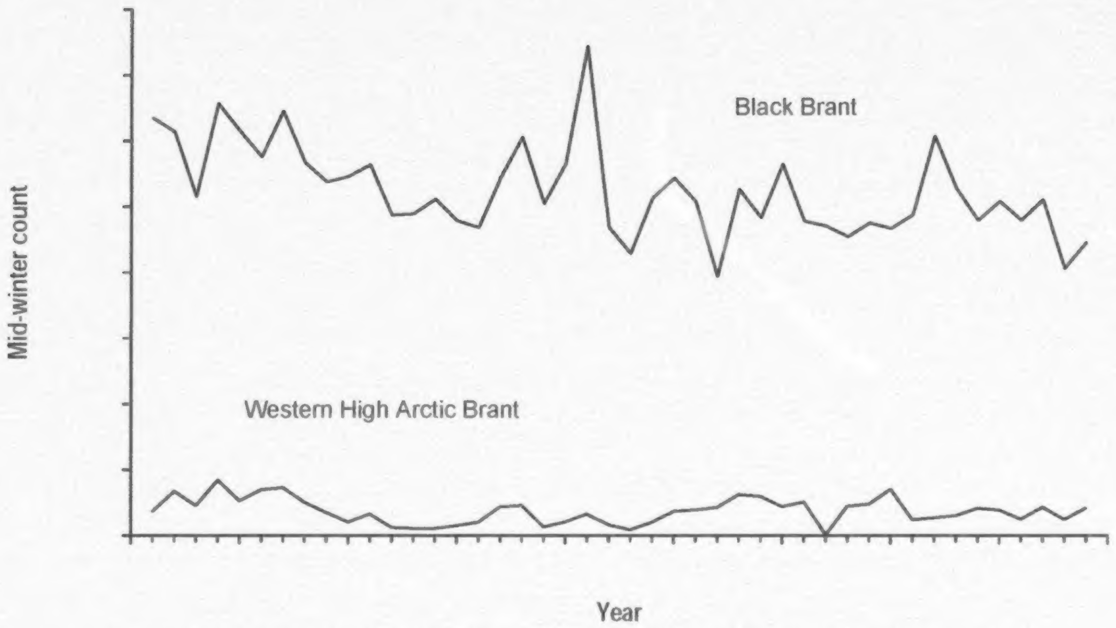


Figure 42. Mid-winter inventory of Black and Western High Arctic Brant.

Note that beginning in 1986 Black Brant numbers include counts along the Alaska coast (range of 4,300 to 17,800 birds).

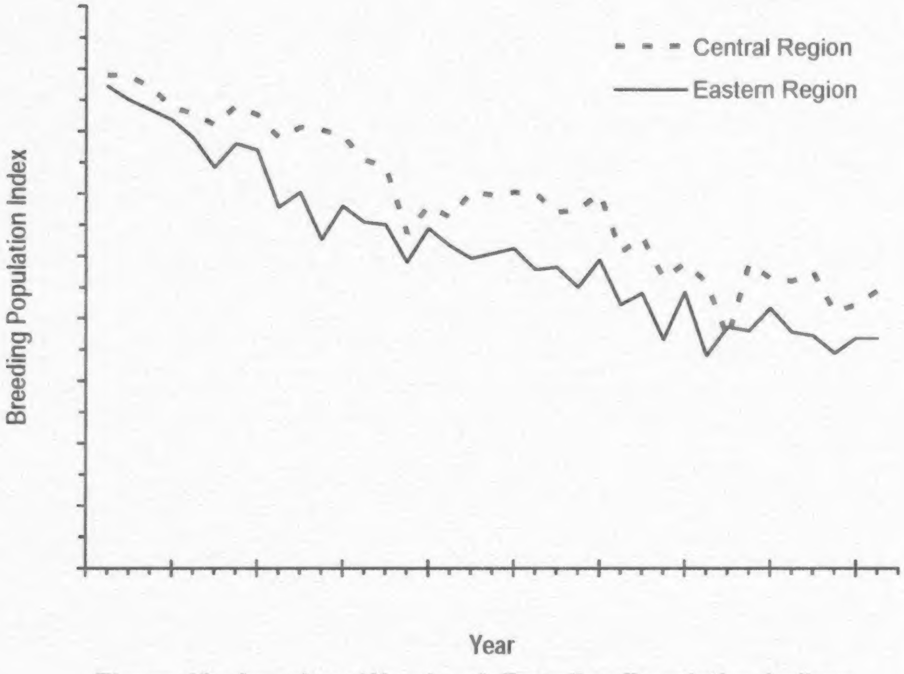


Figure 43. American Woodcock Breeding Population Indices.

Indices (singing males per route) from the Singing-ground Survey (Kelley, 2004)

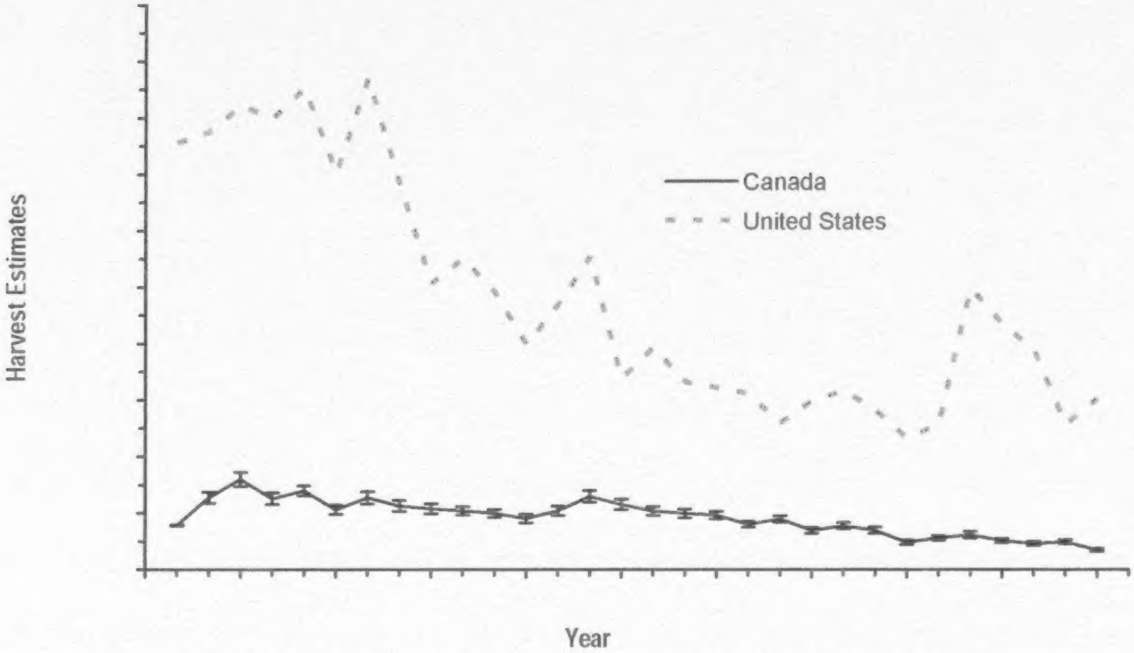


Figure 44. American Woodcock Harvest in Canada and the United States.

(B. Collins, J.F. Gobeil ,CWS and P. Padding, USFWS)

The USFWS recently implemented an improved national harvest survey. The results from 1999 onward are considered preliminary and are not directly comparable to those prior to 1999.

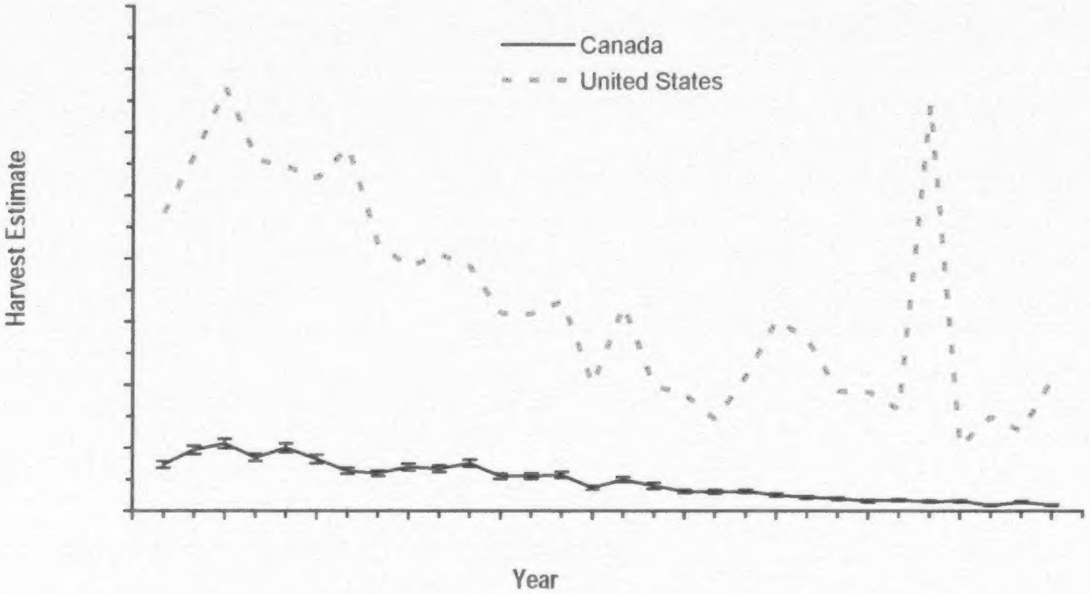


Figure 45. Common Snipe Harvest Estimates in Canada and the United States.

(B. Collins, J.F. Gobeil, CWS and P. Padding, USFWS)

The USFWS recently implemented an improved national harvest survey. The results from 1999 onward are considered preliminary and are not directly comparable to those prior to 1999.

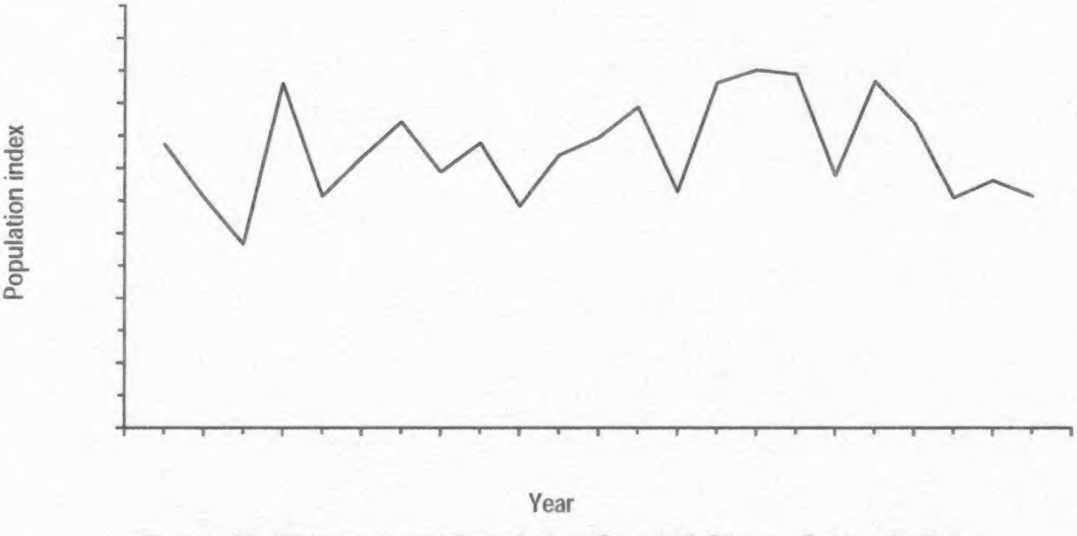


Figure 46. Mid-continent Population Sandhill Cranes Spring Indices.

Note that 2004 value is for Central Platte River Valley only, uncorrected for visibility (Sharp et al., 2004)

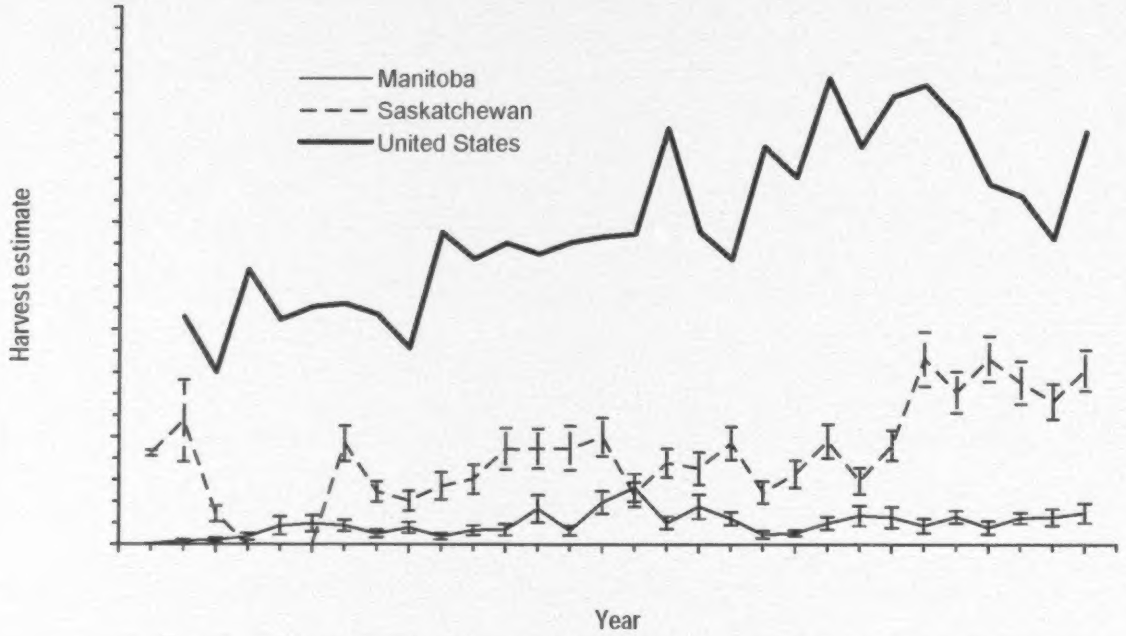


Figure 47. Harvest Estimates of Sandhill Cranes in Canada and the United States.

Canadian harvest estimates ±1 SE (J.-F. Gobeil and B. Collins CWS), U.S. harvest estimates (Sharp et al., 2004).

The USFWS recently implemented an improved national harvest survey. The results for years prior to 1999 are not directly comparable to those from 1999 onward.

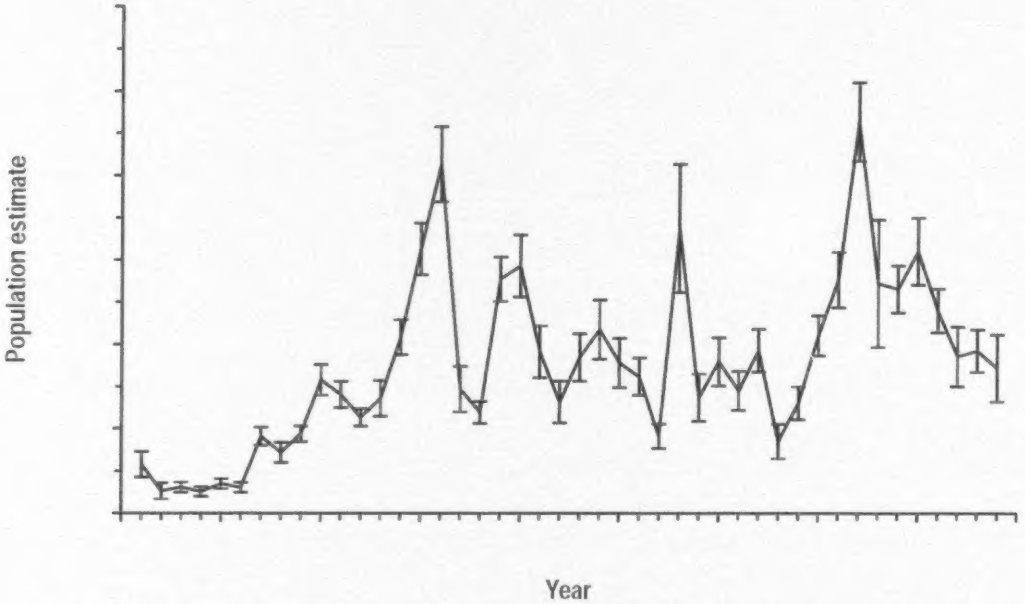


Figure 48. American Coot Breeding Population in the Canadian Prairies.

(± 1 SE) Waterfowl Breeding Population and Habitat Survey.

Tables

Table 1. Most abundant inland duck species in the Black Duck Breeding Ground Survey area of eastern Canada; estimated number of indicated breeding pairs (SE).

	Region									
Species/Year	Atlantic highlands		Boreal shield - eastern		Boreal shield - central		Boreal shield - western		Entire survey area	
Black Duck										
1990	51,869	(9,461)	70,114	(13,005)	58,301	(6,928)				
1991	45,552	(6,544)	55,838	(9,928)	53,078	(6,186)	77,430	(7,587)	231,898	(15,402)
1992	48,587	(6,109)	54,073	(9,666)	49,135	(5,276)	76,353	(9,666)	228,148	(15,875)
1993	47,663	(5,455)	40,478	(8,155)	43,266	(7,459)	65,529	(10,888)	196,936	(16,445)
1994	45,674	(5,534)	47,022	(14,459)	30,296	(5,864)	56,655	(6,850)	179,647	(17,916)
1995	51,485	(11,778)	51,710	(7,848)	34,429	(5,273)	58,443	(11,729)	196,067	(19,123)
1996	60,848	(5,167)	60,520	(8,555)	52,846	(8,141)	88,666	(13,838)	262,880	(18,912)
1997	57,963	(7,803)	58,211	(9,666)	47,041	(4,876)	68,458	(9,769)	231,674	(16,538)
1998	91,797	(12,005)	57,633	(8,103)	63,609	(7,399)	74,438	(9,789)	287,477	(18,982)
1999	89,874	(13,347)	109,932	(15,749)	74,976	(7,139)	100,419	(16,618)	375,201	(27,446)
2000	90,573	(8,432)	111,381	(14,581)	77,395	(8,647)	94,439	(14,365)	373,787	(23,766)
2001	83,087	(13,347)	70,145	(10,668)	68,204	(9,312)	71,757	(7,444)	293,193	(20,832)
2002	86,676	(12,162)	81,756	(18,496)	78,604	(9,235)	129,493	(21,416)	376,529	(32,155)
2003	64,520	(9,636)	71,088	(8,054)	63,730	(8,149)	81,036	(11,771)	280,374	(19,044)
2004	56,477	(6,554)	71,606	(8,870)	69,897	(8,246)	77,943	(10,724)	275,923	(17,454)
Mallard										
1990	871	(393)	-	-	3,564	(1,057)				
1991	955	(434)	361	(361)	2,092	(927)	55,750	(10,750)	59,157	(10,805)
1992	656	(280)	369	(369)	2,546	(1,073)	55,750	(10,521)	59,320	(10,586)
1993	426	(314)	964	(963)	1,612	(874)	50,512	(9,254)	53,514	(9,350)
1994	426	(240)	-	-	1,528	(1,112)	44,141	(10,035)	46,095	(10,099)
1995	341	(340)	1,334	(1,333)	1,707	(1,239)	42,418	(19,854)	45,801	(19,940)
1996	1,399	(714)	1,183	(872)	5,563	(1,580)	64,747	(13,796)	72,891	(13,932)
1997	1,749	(891)	771	(538)	4,595	(1,924)	55,261	(13,746)	62,376	(13,919)
1998	1,224	(423)	386	(385)	4,837	(1,796)	36,291	(9,320)	42,738	(9,509)
1999	5,071	(1,534)	754	(527)	7,014	(2,131)	60,623	(12,497)	73,461	(12,780)
2000	6,120	(2,087)	394	(394)	3,144	(1,167)	112,585	(23,688)	122,243	(23,812)
2001	2,692	(944)	377	(377)	4,595	(1,861)	62,272	(14,608)	69,936	(14,761)
2002	2,871	(1,136)	-	-	5,805	(1,756)	51,550	(10,806)	60,226	(11,006)
2003	4,896	(1,518)	754	(527)	8,707	(3,202)	80,830	(17,424)	95,187	(17,788)
2004	7,868	(2,038)	1,476	(886)	5,563	(1,462)	97,326	(20,293)	112,234	(20,467)
Green-winged Teal										
1990	6,674	(2,231)	10,481	(3,488)	8,401	(2,190)				
1991	6,683	(1,774)	13,372	(3,834)	8,890	(1,647)	11,850	(2,855)	40,795	(5,358)
1992	6,032	(1,686)	12,919	(2,908)	8,656	(3,191)	11,850	(3,265)	39,457	(5,669)
1993	3,978	(1,244)	14,938	(6,104)	2,687	(1,309)	8,646	(2,097)	30,250	(6,702)
1994	5,399	(1,401)	11,413	(3,596)	8,147	(3,408)	13,197	(4,033)	38,155	(6,540)
1995	6,137	(1,907)	13,344	(5,116)	4,553	(1,682)	14,139	(5,074)	38,174	(7,641)
1996	9,092	(2,034)	12,222	(2,958)	9,916	(2,116)	24,744	(6,028)	55,975	(7,329)
1997	9,792	(2,117)	13,493	(3,010)	5,805	(1,374)	16,496	(4,916)	45,585	(6,293)
1998	9,442	(2,084)	16,962	(4,318)	5,805	(1,756)	11,547	(2,696)	43,756	(5,774)
1999	14,338	(3,167)	18,856	(6,850)	5,563	(1,542)	21,445	(6,228)	60,202	(9,906)
2000	11,540	(1,769)	20,502	(5,015)	20,800	(5,040)	28,456	(5,492)	81,298	(9,157)
2001	11,844	(2,806)	19,611	(6,131)	10,400	(2,277)	13,197	(3,881)	55,051	(8,106)
2002	13,279	(4,087)	26,944	(8,022)	11,609	(2,568)	16,496	(3,451)	68,329	(9,978)
2003	9,967	(2,570)	13,199	(6,414)	10,158	(2,609)	18,558	(5,825)	51,882	(7,680)
2004	12,764	(2,500)	19,562	(3,965)	13,786	(2,869)	29,693	(8,286)	75,805	(9,943)

Table 1 cont'd. Most abundant inland duck species in the Black Duck Breeding Ground Survey area of eastern Canada; estimated number of indicated breeding pairs (SE), (Collins, 2004).

	Region									
Species/Year	Atlantic highlands		Boreal shield - eastern		Boreal shield - central		Boreal shield - western		Entire survey area	
Ring-necked Duck										
1990	16,685	(3,120)	38,671	(7,532)	32,587	(5,587)				
1991	16,093	(3,258)	45,538	(9,917)	23,009	(4,070)	57,366	(8,789)	142,006	(14,240)
1992	13,245	(2,457)	31,005	(7,488)	22,149	(3,622)	65,445	(8,345)	131,844	(12,035)
1993	15,485	(3,372)	35,177	(9,429)	25,261	(6,110)	48,236	(9,235)	124,160	(14,929)
1994	14,775	(3,156)	32,413	(8,450)	26,477	(5,218)	47,781	(7,585)	121,446	(12,889)
1995	16,366	(5,375)	16,013	(4,292)	29,023	(5,682)	37,705	(12,122)	99,107	(15,051)
1996	15,562	(2,869)	24,445	(5,890)	20,800	(4,025)	54,024	(8,845)	114,830	(11,720)
1997	18,884	(3,865)	24,672	(7,377)	33,618	(5,139)	47,426	(8,155)	124,600	(12,739)
1998	21,157	(3,548)	27,371	(6,386)	21,042	(3,296)	33,404	(7,102)	102,974	(10,708)
1999	30,249	(6,102)	33,187	(5,720)	35,069	(6,190)	45,364	(9,281)	143,870	(13,943)
2000	24,479	(3,867)	49,678	(12,451)	43,534	(5,691)	54,437	(8,932)	172,128	(16,797)
2001	26,200	(4,849)	59,963	(13,199)	30,232	(5,290)	42,477	(8,510)	158,872	(17,266)
2002	23,329	(4,003)	59,794	(14,836)	16,446	(3,774)	61,860	(10,872)	161,429	(19,198)
2003	21,332	(4,037)	39,221	(7,451)	38,939	(6,554)	67,633	(14,324)	167,125	(17,887)
2004	25,528	(6,273)	49,829	(11,976)	35,795	(5,755)	65,984	(14,376)	177,136	(20,556)
Wood Duck										
1990	725	(372)	-	-	2,037	(974)				
1991	818	(461)	-	-	523	(364)	29,087	(10,001)	30,428	(10,019)
1992	1,967	(777)	-	-	509	(354)	30,164	(7,644)	32,640	(7,691)
1993	852	(435)	-	-	-	-	35,495	(12,466)	36,347	(12,474)
1994	1,563	(544)	-	-	2,546	(2,070)	49,147	(20,646)	53,255	(20,757)
1995	3,751	(1,673)	-	-	5,122	(2,050)	32,992	(21,230)	41,864	(21,394)
1996	2,273	(676)	394	(394)	726	(724)	23,919	(8,379)	27,312	(8,447)
1997	1,574	(768)	771	(538)	1,451	(552)	32,580	(15,227)	36,375	(15,266)
1998	2,623	(1,336)	-	-	967	(674)	19,795	(10,961)	23,385	(11,063)
1999	3,497	(1,692)	1,509	(728)	1,935	(1,303)	52,375	(21,392)	59,315	(21,511)
2000	2,448	(917)	789	(788)	2,419	(1,328)	45,364	(17,305)	51,019	(17,398)
2001	1,974	(990)	-	-	2,902	(1,048)	29,693	(11,476)	34,569	(11,566)
2002	2,153	(1,091)	738	(737)	2,177	(946)	43,302	(23,422)	48,370	(23,478)
2003	3,147	(1,025)	754	(753)	2,660	(1,146)	55,674	(23,003)	62,236	(23,067)
2004	1,749	(597)	738	(737)	1,209	(511)	39,590	(15,285)	43,286	(15,323)

Table 2. Most abundant inland duck species in the Black Duck Breeding Ground Survey area of Eastern Canada; trends in indicated breeding pairs from 1990-2004.

Trends are expressed as an annual percentage change; the number of plots used in the analysis is given in parentheses (Collins 2004).

	Region				
Species	**Atlantic highlands (78 plots)**	**Boreal shield Eastern (90 plots)**	**Boreal shield Central (80 plots)**	**Boreal shield Western (64 plots)**	**Entire Survey Area (309 plots)**

Table 3. Inland duck species in southern Ontario; indicated breeding pairs observed during breeding waterfowl surveys on ground plots in southern Ontario.

Species	1971	1985	1987	1992	1995	1998	2000	2003
Black duck	60	16	18	28	15	9	6	9
Mallard	173	251	300	296	292	288	288	293
Wood duck	29	79	90	103	102	107	75	89
Green-winged teal	48	11	12	26	27	17	33	18
Blue-winged teal	-	56	48	33	15	15	12	12

Data source: N. North and J. Vanos (CWS).
Note: *Values shown above are adjusted totals , i. e. not all plots are used for comparison among years.*

Table 4. Harvest estimates of American Black Ducks in Canada and the United States.

	Canada													United States[1]				Continental
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT/NU	YT	Total	AF	MF	CF	Total	Total
1974	19,543	11,684	29,594	14,008	75,534	61,702	511						212,576	294,700	93,300	999	388,999	601,575
1975	35,354	14,620	59,467	21,876	90,593	85,070	262	118					307,360	275,000	81,000	1,197	357,197	664,557
1976	23,770	21,891	48,624	23,342	120,622	96,761	180	586	143	64			335,983	327,500	97,800	837	426,137	762,120
1977	38,835	18,044	46,186	20,568	129,618	82,886	727	547		48			337,459	194,900	78,900	249	274,049	611,508
1978	49,008	19,660	47,874	34,598	130,379	89,818	379			66			371,782	262,200	74,600	0	336,800	708,582
1979	44,658	12,732	33,687	24,339	112,926	87,557	242	363	256	266			317,026	231,000	68,300	0	299,300	616,326
1980	32,316	21,568	67,341	28,094	120,602	91,503	2,171	268					363,863	309,200	87,100	751	397,051	760,914
1981	38,047	16,133	58,692	26,460	105,733	76,298	337	213		41			321,954	230,900	59,000	505	290,405	612,359
1982	26,961	25,771	47,447	32,130	117,514	86,650	161	426					337,060	186,700	48,400	0	235,100	572,160
1983	32,956	25,049	57,725	31,007	101,637	60,454	259						309,087	139,100	58,800	317	198,217	507,304
1984	26,119	23,256	51,880	33,283	106,868	64,272	327		518				306,523	147,800	53,900	0	201,700	508,223
1985	28,556	18,535	44,397	32,261	110,998	64,692	427	135					300,001	148,100	41,700	180	189,980	489,981
1986	27,278	18,650	46,612	27,896	114,493	60,461	367	260	151				296,168	140,700	37,400	442	178,542	474,710
1987	20,184	18,114	39,138	27,218	129,612	61,176							295,442	135,400	36,700	112	172,212	467,654
1988	20,137	20,364	44,311	30,193	127,134	58,840		151	92				301,222	124,600	29,000	512	154,112	455,334
1989	29,299	11,548	47,322	25,582	99,675	47,518	144						261,088	148,800	44,600	326	193,726	454,814
1990	22,663	11,369	38,012	26,743	105,277	38,357	106	621	286	103			243,537	110,600	32,300	422	143,322	386,859
1991	15,073	14,499	39,295	20,122	85,220	48,670	1,189	312	1,329	229			225,938	126,400	40,900	220	167,520	393,458
1992	13,487	8,043	41,079	23,090	82,134	38,228	138	239	73				206,511	97,700	37,900	106	135,706	342,217
1993	13,133	10,741	36,298	19,591	87,869	34,556	1,125						203,313	105,400	41,200	66	146,666	349,979
1994	16,507	10,221	32,670	23,389	67,440	24,774	254	169				35	175,459	101,600	28,600	266	130,466	305,925
1995	15,461	13,355	40,546	29,332	54,776	33,470		204		17			187,161	126,500	42,300	0	168,800	355,961
1996	19,447	9,469	39,759	20,418	49,219	25,289							163,601	84,000	34,500	0	118,500	282,101
1997	18,816	12,982	32,666	17,966	56,103	26,309	265	147	215				165,469	110,200	41,500	79	151,779	317,248
1998	22,410	6,789	33,852	22,802	49,065	23,091	165		81	124			158,379	119,600	56,100	236	175,936	334,315
1999[2]	19,058	10,782	44,658	22,445	51,385	26,579	36						174,943	111,400	42,200	0	153,600	328,543
2000	21,605	6,980	43,922	18,083	43,476	19,995	204	653					154,918	127,500	52,000	0	179,500	334,418
2001	16,800	9,465	26,729	12,879	38,717	19,185	293						124,068	94,559	30,636	0	125,195	249,263
2002	18,021	6,214	28,310	14,449	36,346	19,130		76	89				122,635	128,620	47,465	453	176,538	299,173
2003[3]	10,174	7,228	26,010	15,219	35,077	15,176		334					109,218	95,108	33,971	134	129,213	238,431

Table 5. **May Pond and Most Abundant Inland Duck Species breeding population trend estimates in the traditional survey area of the Waterfowl Breeding Population and Habitat Survey.**

Trends were calculated using the estimating equations technique (Link and Sauer 1994) and are expressed as an annual percentage change; the number of strata is given in parentheses (a minimum of 5 strata was deemed necessary to perform a trend analysis).

Species	Time period	Region				Entire survey area
		Alaska	Western Boreal Canada	Canadian Prairies	U.S. Prairies	
		(11 strata)	(17 strata)	(15 strata)	(9 strata)	(52 strata)
May ponds[1]	1974-2004	N/A	N/A	1.0 * (15)	1.0 * (9)	-0.4 (24)
	1995-2004	N/A	N/A	-7.5 * (15)	-6.6 * (9)	-7.2 * (24)
	2000-2004	N/A	N/A	4.0 (15)	-3.1 * (9)	1.3 (24)
Total ducks[2]	1961-2004	1.8 (11)	-0.2 (17)	-0.6 * (15)	1.8 * (9)	0.3 (52)
	1995-2004	3.1 * (11)	1.2 (17)	-3.8 * (15)	-4.3 * (9)	-1.5 * (52)
	2000-2004	-5.0 (11)	2.5 (17)	-2.7 (15)	-15.0 * (9)	-4.6 * (52)
Mallard	1961-2004	3.7 * (11)	-0.1 (17)	-0.7 (15)	2.5 * (9)	0.3 (52)
	1995-2004	4.6 * (10)	-1.1 (17)	-2.7 * (15)	-3.1 * (9)	-1.8 * (52)
	2000-2004	2.9 (10)	-0.7 (17)	-4.4 * (15)	-11.3 * (9)	-4.9 * (52)
Gadwall	1961-2004	5.1 (8)	3.8 (17)	1.2 * (15)	4.1 * (9)	2.5 * (49)
	1995-2004		4.2 (16)	-2.5 * (15)	-4.9 (9)	-3.5 * (42)
	2000-2004		6.2 (14)	6.0 (15)	-13.3 * (9)	-4.6 (40)
American Wigeon	1961-2004	4.2 * (11)	-0.8 * (17)	-2.6 * (15)	1.3 (9)	-0.2 (52)
	1995-2004	2.5 * (11)	-2.2 (17)	-8.2 * (15)	-8.4 * (9)	-2.2 (52)
	2000-2004	-5.6 * (11)	-1.2 (17)	-14.0 * (15)	-15.6 * (9)	-6.1 * (52)
Green-winged Teal	1961-2004	4.9 * (11)	0.9 * (17)	-0.3 (15)	1.8 * (9)	1.5 * (52)
	1995-2004	5.2 * (11)	3.0 (17)	-8.4 * (15)	-2.2 (8)	0.9 (51)
	2000-2004	-3.0 (11)	-3.2 (17)	-18.0 * (15)	9.6 (8)	-4.9 (51)
Blue-winged Teal	1961-2004		0.2 (16)	0.2 (15)	2.0 * (9)	0.9 * (43)
	1995-2004		5.8 * (12)	-2.7 * (15)	-4.0 * (9)	-2.8 * (37)
	2000-2004		8.6 (11)	-4.6 (15)	-20.2 * (9)	-12.4 * (35)
Northern Shoveler	1961-2004	6.9 * (11)	0.8 (17)	0.9 (15)	1.7 * (9)	1.8 * (52)
	1995-2004	3.2 (11)	3.7 (16)	-2.2 (15)	-5.2 * (9)	-1.5 (51)
	2000-2004	-6.2 (11)	3.3 (15)	4.4 (15)	-15.8 * (9)	-3.6 (50)
Northern Pintail	1961-2004	0.5 (11)	-2.6 * (17)	-3.3 * (15)	-1.7 * (9)	-2.0 * (52)
	1995-2004	3.2 * (11)	2.7 (16)	-5.3 * (15)	-9.9 * (9)	-2.9 (51)
	2000-2004	-14.0 (11)	-4.8 (16)	6.4 (15)	-18.0 (9)	-8.4 (51)
Redhead	1961-2004	3.1 (8)	-0.2 (17)	0.8 (15)	1.2 (9)	0.8 * (49)
	1995-2004		5.0 * (14)	-5.8 * (15)	-6.0 * (9)	-4.9 * (40)
	2000-2004		18.3 (12)	-10.0 (15)	-18.0 * (9)	-10.4 * (37)
Canvasback	1961-2004	1.5 * (11)	0.3 (17)	0.1 (15)	1.3 (9)	0.5 (52)
	1995-2004	1.9 (10)	-1.8 (16)	-7.2 (15)	-5.1 * (9)	-4.3 * (50)
	2000-2004	-2.0 (9)	6.3 (16)	-9.5 (15)	1.6 (8)	-2.7 (45)
Scaup spp.	1961-2004	0.2 (11)	-1.3 * (17)	-0.7 (15)	2.7 * (9)	-0.9 * (52)
	1995-2004	1.1 (11)	-0.2 (17)	-11.5 * (15)	0.1 (9)	-1.7 (52)
	2000-2004	-5.9 (11)	4.3 (17)	-14.1 * (15)	0.8 (8)	-1.2 (51)
Ring-necked Duck	1961-2004	11.4 * (11)	2.9 * (17)	2.2 * (15)	5.2 * (9)	3.1 * (52)
	1995-2004	13.7 (9)	3.7 * (17)	0.0 (15)	-14.4 * (8)	3.2 * (49)
	2000-2004	2.9 (9)	0.2 (17)	-7.0 (14)	-8.6 (7)	-0.1 (47)
Ruddy Duck	1961-2004		3.5 * (16)	1.5 * (15)	2.8 * (9)	2.2 * (42)
	1995-2004		6.9 * (14)	1.7 (15)	4.4 (8)	3.4 (38)
	2000-2004		20.4 (10)	18.5 * (14)	-13.6 (8)	6.9 (33)

* Trend significant at $P < 0.05$

[1] Adjusted May pond estimates for the U.S. Prairies are only available since 1974; pond estimates from strata 75 and 76 (Western Boreal Canada) which are counted since 1989 were excluded from the analysis.

[2] Total ducks include all species of ducks observed during the survey, including sea ducks.

Table 6. Harvest estimates of Mallards in Canada and the United States.

	Canada													United States[1]					Continental
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT/NU	YT	Total	AF	MF	CF	PF	Total	Total
1974	154	130	406	761	50,036	191,532	105,723	366,291	488,448	62,595			1,266,076	383,600	2,245,000	809,469	1,166,691	4,604,760	5,870,836
1975	774	405	972	583	57,791	296,173	159,142	567,985	521,935	122,725	1,698	797	1,730,980	409,200	2,518,100	934,916	1,158,971	5,021,187	6,752,167
1976	770	256	753	748	71,851	322,047	204,598	606,239	609,576	114,198	3,229	898	1,935,163	478,400	2,409,400	975,705	1,226,374	5,089,879	7,025,042
1977	836	196	1,155	992	81,835	268,878	165,257	391,986	510,396	131,066	3,073	584	1,556,254	388,400	2,270,200	789,526	987,899	4,436,025	5,992,279
1978	850	259	2,659	452	61,507	322,006	239,298	395,276	382,319	115,038	2,098	1,290	1,523,052	442,500	2,257,000	1,059,753	1,265,553	5,024,806	6,547,858
1979	555	465	3,077	725	70,597	266,018	245,016	419,509	485,014	117,176	1,182	1,673	1,611,007	437,600	2,346,100	923,077	1,065,704	4,772,481	6,383,488
1980		948	3,056	1,436	82,027	290,941	210,152	355,042	480,188	104,768	2,551	2,473	1,533,582	435,100	2,347,500	786,838	1,081,558	4,650,996	6,184,578
1981	2,945	1,461	2,536	2,491	91,946	279,541	175,213	231,119	392,273	114,672	1,703	1,033	1,296,933	444,600	2,062,000	784,424	1,051,566	4,342,590	5,639,523
1982	438	410	1,406	1,792	93,288	335,813	148,862	241,734	296,124	92,492	1,552		1,213,911	395,900	1,781,600	683,066	1,047,074	3,907,640	5,121,551
1983	1,067	937	4,044	2,557	87,349	297,944	160,521	284,403	364,000	121,758	2,417	603	1,327,600	417,400	2,017,900	772,567	1,211,534	4,419,401	5,747,001
1984	1,097	738	2,120	1,668	67,432	284,128	117,207	183,300	306,234	89,453	4,501	1,366	1,059,244	382,700	1,796,100	742,790	1,002,926	3,924,516	4,983,760
1985	794	1,149	3,310	3,258	97,037	293,333	87,172	158,302	180,117	81,943	4,153	914	911,482	319,900	1,532,900	510,761	957,871	3,321,432	4,232,914
1986	2,933	755	3,135	2,526	84,303	265,491	112,363	151,384	182,748	72,263	811	433	879,145	362,700	1,550,100	586,619	870,893	3,370,312	4,249,457
1987	1,020	728	3,692	3,141	116,452	315,101	136,678	154,961	211,929	75,591	1,120	192	1,020,605	340,300	1,458,800	612,465	792,950	3,204,515	4,225,120
1988		902	2,304	1,620	83,748	233,556	64,324	75,853	139,565	63,700	2,543	412	668,527	257,200	874,500	324,709	532,958	1,989,367	2,657,894
1989	1,280	925	4,339	2,246	79,419	263,152	70,132	75,645	188,516	57,269	438	773	744,134	321,400	1,094,500	335,216	582,170	2,333,286	3,077,420
1990	1,162	1,028	3,557	3,183	86,524	261,267	60,851	79,494	175,921	60,395	866	290	734,538	267,000	1,091,000	326,984	602,541	2,287,525	3,022,063
1991	949	1,106	3,712	4,582	84,483	229,026	60,932	70,050	122,105	51,458	94	641	629,138	317,600	1,189,600	293,744	553,618	2,354,562	2,983,700
1992	863	199	6,407	5,243	87,824	196,647	65,991	68,765	94,795	52,172	605	298	579,809	294,100	1,250,400	366,488	627,239	2,538,227	3,118,036
1993	1,025	1,178	5,029	3,755	100,032	202,647	42,969	50,351	83,094	45,181	1,178	560	536,999	312,500	1,338,200	398,079	687,879	2,736,658	3,273,657
1994	795	864	3,305	2,894	107,222	197,833	57,923	88,848	113,068	50,412	2,042	205	625,411	328,500	1,524,700	510,957	744,432	3,108,589	3,734,000
1995	532	751	4,822	5,131	83,307	176,680	74,206	104,296	111,048	40,782	1,509	278	603,342	424,100	2,347,100	694,402	940,265	4,405,867	5,009,209
1996	351	1,024	4,286	4,044	82,201	176,869	91,265	121,608	115,668	42,447	1,326		641,089	408,000	2,493,900	764,215	1,185,491	4,851,606	5,492,695
1997	1,461	417	8,047	5,371	77,594	178,169	107,379	133,017	151,167	55,513	437	126	718,698	478,900	2,852,000	886,166	1,161,510	5,378,576	6,097,274
1998	1,628	1,011	5,440	7,512	76,320	164,431	104,469	129,461	119,826	52,663	881	276	663,918	445,500	2,762,800	953,367	1,428,079	5,589,746	6,253,664
1999[2]	1,188	667	6,305	4,866	69,568	131,901	82,637	182,714	105,126	48,002		220	633,194	438,000	3,060,800	878,434	1,121,810	5,499,044	6,132,238
2000	1,511	1,915	5,481	5,999	81,655	162.352	78,201	195,276	107,203	49,272	510	72	689,447	499,100	3,041,100	1,112,643	1,025,082	5,677,925	6,367,372
2001	600	1,192	5,720	7,046	79,895	166,628	92,114	107,411	94,698	35,574	642	229	591,749	467,064	2,768,031	1,151,367	997,216	5,383,678	5,975,427
2002	299	2,175	6,498	6,001	66,532	147,844	77,991	118,856	80,706	37,370	1,701	609	546,582	554,703	2,423,134	1,003,381	934,379	4,915,597	5,462,179
2003[3]	694	803	4,711	6,509	58,871	138,096	66,402	126,396	73,086	35,383	409	109	511,469	427,301	2,571,468	942,199	1,078,236	5,019,204	5,530,673

Table 7. Harvest estimates of Northern Pintails in Canada and the United States.

	Canada													United States[1]					Continental
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT/NU	YT	Total	AF	MF	CF	PF	Total	Total
1974	939	820	659	790	14,043	8,296	7,545	39,226	69,214	14,281			155,813	34,500	122,900	162,518	928,387	1,248,305	1,404,118
1975	1,092	431	612	787	21,999	9,644	20,611	55,909	81,637	23,758	72	417	216,969	41,200	206,500	273,525	1,045,461	1,566,686	1,783,655
1976	1,507	651	2,663	352	27,578	17,112	17,545	34,693	59,532	38,626	385	277	200,921	42,200	157,100	194,803	928,063	1,322,166	1,523,087
1977	2,438	1,653	1,717	607	39,581	14,333	11,243	20,469	69,905	29,464	137	313	191,860	50,700	213,700	179,906	540,749	985,055	1,176,915
1978	824	829	1,892	1,039	21,298	13,077	21,072	14,051	38,039	22,830	698	216	135,865	35,800	210,600	239,442	851,665	1,337,507	1,473,372
1979	1,693	579	1,056	382	14,958	9,326	19,745	30,588	48,505	17,735	691	287	145,545	48,670	213,600	228,806	829,316	1,320,392	1,465,937
1980	905	510	757	1,384	16,722	13,248	12,872	16,868	44,003	21,392		108	128,769	38,600	215,600	193,055	633,316	1,080,571	1,209,340
1981	1,536	747	951	1,144	17,437	11,977	16,099	2,430	39,745	18,658	91	148	110,963	27,900	208,000	151,027	403,876	790,803	901,766
1982		1,531	1,009	1,479	20,791	10,946	13,290	12,598	29,130	14,021			104,795	38,600	126,500	158,668	467,585	791,353	896,148
1983	2,805	523	694	303	15,867	10,767	11,195	17,056	27,154	13,385	1,864	175	101,788	18,600	187,200	138,918	465,099	809,817	911,605
1984	1,698	1,047	717	908	9,253	10,132	13,131	12,343	34,016	19,661	168	337	103,411	34,600	153,500	165,663	312,492	666,255	769,666
1985	1,459	748	1,460	1,817	16,486	15,345	9,668	8,117	24,051	11,244		810	91,205	21,700	125,000	83,916	292,714	523,330	614,535
1986	634	565	846	1,841	13,163	9,057	6,988	9,077	8,632	8,885		296	59,984	19,000	90,200	72,074	274,961	456,235	516,219
1987	807	2,218	632	1,017	11,864	6,020	5,478	8,386	19,668	10,945		158	67,193	15,800	88,300	122,425	311,417	537,942	605,135
1988	1,998	1,449	486	715	12,160	8,019	13,779	5,320	14,667	10,831			69,424	7,200	39,200	36,392	116,308	199,100	268,524
1989	1,421	660	344	1,406	15,460	11,511	7,560	4,326	11,766	8,549	45		63,048	14,500	65,100	43,595	139,517	262,712	325,760
1990	4,114	450	653	1,707	19,568	8,231	5,279	10,087	13,483	7,750	281	41	71,644	10,500	49,400	43,207	133,164	236,271	307,915
1991	351	542	901	844	9,357	4,742	4,407	4,023	5,689	4,179	112	73	35,220	14,200	40,400	28,687	126,414	209,701	244,921
1992		910	79	464	6,221	4,861	5,236	2,126	6,914	6,393	136	77	33,417	12,200	56,200	31,508	116,250	216,158	249,575
1993	1,090	1,336	852	706	11,401	5,156	5,172	3,253	4,025	4,701	61		37,753	13,000	52,300	42,486	140,620	248,406	286,159
1994	934	765	1,163	1,136	11,307	4,649	4,866	7,302	7,518	4,738		64	44,442	18,000	81,100	61,088	150,361	310,549	354,991
1995	1,727	454	965	1,240	7,831	4,552	8,974	6,521	7,573	4,476			44,313	32,700	136,200	94,351	259,351	522,602	566,915
1996	1,246	478	897	1,234	5,043	4,011	10,323	14,477	9,621	5,367			52,697	19,200	124,000	95,340	281,630	520,170	572,867
1997	785	139	116	493	7,423	5,560	13,248	13,656	13,883	5,422	37		60,762	23,800	145,000	186,191	340,419	695,410	756,172
1998	1,026		653	757	7,735	6,361	14,347	11,099	11,119	6,462	19	276	59,854	33,100	177,000	123,391	238,677	572,168	632,022
1999[2]	390	1,137	755	1,790	8,956	6,457	9,830	10,610	10,304	5,464		0	55,693	25,200	148,299	133,317	232,704	539,520	595,213
2000	470	509	499	581	6,480	5,397	8,766	16,168	13,603	5,825	50		58,348	20,752	155,082	134,252	201,163	511,249	569,597
2001	137		400	610	4,910	3,708	9,215	7,050	8,730	4,806	18	59	39,643	19,276	122,522	135,039	158,115	434,952	474,595
2002	1,153	77	542	702	5,526	9,908	13,878	13,053	7,640	4,549			57,028	17,089	102,481	60,469	143,370	323,409	380,437
2003[3]	571	598	227	1,270	6,794	10,420	8,998	8,687	8,204	1,947	234		47,950	18,134	123,318	55,080	144,581	341,113	389,063

[1] AF: Atlantic Flyway, MF: Mississippi Flyway, CF: Central Flyway, PF: Pacific Flyway.

[3] Harvest data for the U.S. are preliminary.
Data source: J.F.Gobeil and B. Collins (CWS), and P. Padding (USFWS).

Table 8. Harvest estimates of Lesser Scaup in Canada and the United States.

	Canada													United States[1]					Continental
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT/NU	YT	Total	AF	MF	CF	PF	Total	Total
1974	3,601	37	688	731	22,326	43,359	16,244	10,698	9,432	1,612			108,728	35,900	330,800	58,855	23,575	449,130	557,858
1975	6,323	166	1,450	943	28,681	43,739	21,748	10,861	18,870	2,661	369	661	136,472	33,200	250,400	48,734	24,456	356,790	493,262
1976	656	89	1,139	238	34,714	50,152	27,108	16,747	14,470	2,243	169	386	148,111	59,100	326,700	96,295	49,009	531,104	679,215
1977	1,033	61	3,552	146	31,895	46,505	11,010	7,250	8,363	3,474	799	237	114,325	199,100	364,400	75,724	45,312	684,536	798,861
1978	1,666	43	1,857		23,451	26,854	14,537	10,400	13,551	3,114	215	341	96,029	39,500	177,300	59,233	38,782	314,815	410,844
1979	241		751	51	26,706	35,097	15,433	7,646	10,827	1,799	571		99,122	19,500	144,600	46,798	40,581	251,479	350,601
1980	2,844	73	662	746	28,850	55,807	27,541	4,910	13,112	1,906	599		137,050	21,100	154,300	34,618	25,958	235,976	373,026
1981	1,607		704	735	31,991	58,463	18,807	3,225	8,980	1,224	507	148	126,391	97,000	325,200	92,567	33,140	547,907	674,298
1982	126		387	309	20,981	37,287	27,394	6,655	13,226	1,721			108,086	39,000	241,000	45,835	31,038	356,873	464,959
1983	471	104	550	575	19,171	42,320	22,289	9,122	6,551	103		78	101,334	34,000	154,500	36,870	43,476	268,846	370,180
1984	1,695	31	352	912	17,696	53,451	18,336	10,861	5,435	975	98	74	109,916	83,900	380,800	151,243	45,752	661,695	771,611
1985	874		365	951	25,866	61,409	15,356	2,498	6,604	1,240	831		115,994	80,600	305,800	71,563	28,489	486,452	602,446
1986	1,839		430	1,646	23,080	47,546	14,674	5,382	5,974	1,191	170		101,932	20,700	164,000	44,452	18,909	248,061	349,993
1987	339	290	615	541	11,981	34,512	10,400	7,129	5,458	1,140		12	72,417	23,100	97,100	44,633	20,408	185,241	257,658
1988		87	943	544	22,429	32,983	6,885	5,019	3,341	496	424		73,151	26,100	84,900	28,418	9,202	148,620	221,771
1989	2,063	52	1,237	1,119	26,710	42,316	7,296	1,347	3,073	608	179		86,000	24,900	69,200	24,097	8,636	126,833	212,833
1990	1,757	35	1,051	1,696	24,047	25,772	6,592	2,557	3,888	778	191		68,364	13,300	58,900	17,035	12,992	102,227	170,591
1991	272		481	455	18,402	31,204	9,226	3,864	2,464	428	37		66,833	11,400	102,600	20,639	15,549	150,188	217,021
1992	1,004		171	116	15,249	24,587	8,227	778	2,320	650	33		53,135	13,200	132,300	28,886	12,712	187,098	240,233
1993	2,231		401	690	20,912	35,173	6,228	2,196	1,628	452	35	40	69,986	13,200	63,700	15,691	13,673	106,264	176,250
1994	510	99	445	244	11,479	27,137	12,344	2,742	3,247	378		52	58,677	20,400	102,000	34,342	20,232	176,974	235,651
1995			334	730	8,705	27,465	14,185	2,263	2,926	242			56,850	26,900	189,000	37,875	31,645	285,420	342,270
1996	178		331	156	7,460	17,344	9,258	2,415	2,800	1,162	331		41,435	35,700	293,800	92,121	38,166	459,787	501,222
1997	232		512	782	6,529	19,843	5,185	4,262	4,863	1,302	431		43,941	41,600	359,800	80,581	28,189	510,170	554,111
1998	1,455		223	1,300	11,513	16,069	5,400	6,287	2,695	311			45,253	61,500	319,300	149,241	30,138	560,179	605,432
1999[2]	470		131	110	8,339	19,599	10,233	2,143	939	181			42,145	70,900	82,900	34,358	21,991	210,149	252,294
2000	26			49	5,071	9,781	11,987	1,284	1,768	178	74	130	30,348	32,400	206,900	85,845	24,798	349,943	380,291
2001	414		60	138	5,082	13,530	8,117	1,777	861	119	128	8	30,234	97,228	165,746	71,646	29,515	364,135	394,369
2002	1,436	548	412	843	5,576	14,259	6,007	1,524	1,791	383		174	32,953	84,399	185,381	84,695	35,972	390,447	423,400
2003[3]	682	183	433	265	8,602	11,995	2,376	3,980	2,311	175	117		31,119	60,939	153,617	44,850	39,190	298,596	329,715

[1] AF: Atlantic Flyway, MF: Mississippi Flyway, CF: Central Flyway, PF: Pacific Flyway.

The USFWS recently implemented an improved national harvest survey. The results for years prior to 1999 are not directly comparable to those from 1999 onward.

[3] Harvest data for the U.S. are preliminary.

Data source: J.F.Gobeil and B. Collins (CWS), and P. Padding (USFWS).

Table 9. Harvest estimates of Greater Scaup in Canada and the United States.

	Canada													United States[1]					Continental
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT/NU	YT	Total	AF	MF	CF	PF	Total	Total
1974	1,788	314	1,620	488	20,243	18,172	572	532		1,039			44,768	41,800	23,882	1,559	9,823	77,064	121,832
1975	1,321		2,401	283	25,353	36,056	1,136	176	1,215	2,986	69		70,996	29,400	24,342	1,160	10,488	65,390	136,386
1976	3,095		3,522	478	28,190	37,526	1,140	291		1,297			75,539	64,800	20,426	780	11,056	97,062	172,601
1977	2,436	217	1,895	244	21,126	44,900				617		64	71,499	55,300	26,696	3,778	29,157	114,931	186,430
1978	1,611		502	141	17,811	20,465	1,782			320		77	42,709	71,400	20,673	1,787	7,802	101,662	144,371
1979	637		959	97	20,315	26,367	677			1,391			50,443	28,400	13,523	385	7,442	49,750	100,193
1980	3,052	147	738	384	18,922	29,535	720			739			54,237	17,900	17,660	1,661	11,518	48,739	102,976
1981	344		170	818	22,891	23,762	1,139			548			49,672	34,600	27,834	4,137	19,712	86,283	135,955
1982	1,476	63	411	584	15,678	15,797				230			34,239	73,000	11,799	1,381	4,712	90,892	125,131
1983	427		1,289	574	13,443	38,628				924			55,285	22,800	30,966	623	13,454	67,843	123,128
1984	2,565	31	1,098	1,125	18,999	22,538	419	561	133	907			48,376	27,900	23,416	2,746	13,170	67,232	115,608
1985	2,423	428	759	272	17,880	28,128	1,022			134		63	51,109	31,700	21,169	1,517	5,627	60,013	111,122
1986	5,095	404	2,213	1,456	11,638	30,320	970	214	151	1,112			53,573	36,400	10,307	844	7,612	55,163	108,736
1987	1,103		672	1,323	6,941	13,103	746	131		318			24,337	18,000	11,445	1,450	8,817	39,712	64,049
1988	920		3,221	585	13,622	13,859				212			32,419	12,300	6,678	1,381	5,843	26,202	58,621
1989	5,264	51	2,547	1,498	9,380	14,701			182	242			33,865	14,300	6,620	317	3,845	25,082	58,947
1990	3,684	79	1,609	420	9,284	11,959	383		195	81			27,694	7,200	12,257	1,305	5,844	26,606	54,300
1991			1,657	267	6,314	9,815	626	474	387	153			19,693	6,700	5,541	1,930	4,706	18,877	38,570
1992	1,360		805	898	4,830	9,913	298			87			18,191	6,100	7,947	1,217	4,101	19,365	37,556
1993	5,959	176	1,161	362	8,589	8,651	163				21		25,082	8,600	11,522	1,036	5,994	27,152	52,234
1994	706		1,501	307	6,550	8,329	306			26			17,725	6,700	13,146	2,936	6,477	29,259	46,984
1995	508	82	920	542	5,080	12,861	268			97			20,358	14,600	19,758	5,204	13,456	53,018	73,376
1996	596	65	772	914	5,839	7,653	286		297				16,422	11,900	21,391	2,871	13,572	49,734	66,156
1997	677	83	919	1,119	3,627	6,002	157			379			12,963	9,700	23,636	12,687	16,860	62,883	75,846
1998	1,703	169	256	1,878	4,055	4,274	165		162				12,662	12,600	15,353	5,375	12,384	45,712	58,374
1999[2]	1,377		332	55	4,171	4,671	929					3	11,538	10,900	9,138	3,282	12,016	35,336	46,874
2000	1,075		1,157	659	2,961	3,190	120						9,162	12,800	15,644	1,912	12,097	42,453	51,615
2001	1,210		234	1,492	1,537	4,276	747			18			9,514	7,582	8,060	1,811	15,249	32,702	42,216
2002	1,125	77	437	1,517	2,725	4,816	690				151		11,538	17,809	30,216	3,591	20,642	72,258	83,796
2003[3]	576	366	524	337	2,100	5,481			173				9,557	17,344	14,469	1,257	16,122	49,192	58,749

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[1]

[2]

[3] Harvest data for the U.S. are preliminary.

Table 10. Harvest estimates of Canvasbacks in Canada and the United States.

	Canada													United States[1]					Continental
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT/NU	YT	Total	AF	MF	CF	PF	Total	Total
1974					1,461	7,530	3,904	5,647	3,344	773			22,659	700	16,200	19,281	38,768	74,949	97,608
1975					2,116	18,757	8,205	9,065	4,262	1,051		17	43,473	1,700	30,500	15,898	45,663	93,761	137,234
1976				20	2,117	17,817	5,321	7,454	3,773	1,360			37,862	23,200	34,000	18,002	51,799	127,001	164,863
1977					1,036	6,162	2,770	4,019	2,076	198		44	16,305	7,100	24,700	10,831	32,486	75,117	91,422
1978					3,293	11,996	4,596	4,544	2,424	233			27,086	5,600	20,400	7,003	31,089	64,092	91,178
1979					3,769	14,208	7,922	7,585	2,239				35,723	9,200	39,300	17,320	26,027	91,847	127,570
1980					3,301	10,966	4,746	1,420	5,431	1,269			27,133	8,200	27,200	7,800	23,129	66,329	93,462
1981					625	8,327	3,883	1,066	5,193	534			19,628	8,200	20,000	4,898	24,932	58,030	77,658
1982					1,440	6,223	7,669	3,236	344				18,912	3,200	13,900	8,130	19,820	45,050	63,962
1983					400	10,970	6,696	2,638	4,040	240			24,984	14,300	31,000	14,207	21,601	81,108	106,092
1984					214	8,279	1,819	4,716	3,620	210		37	18,895	8,500	23,000	14,215	25,548	71,263	90,158
1985					1,435	8,673	3,349	3,617	1,427	201			18,702	9,000	23,200	10,417	37,309	79,926	98,628
1986	216		461		1,082	14,385	3,145	5,242	3,951	956	53		29,491	200	600	1,064	22,119	23,983	53,474
1987					503	6,158	2,945	638	709	463			11,416	100	800	783	17,714	19,397	30,813
1988					504	2,153	2,744	1,491	385	230			7,507	100	100	190	436	826	8,333
1989						3,636	1,255	219	869	45	45		6,069	300	500	333	9,749	10,882	16,951
1990						5,902	1,392	508	697		23		8,522	100	400	334	7,069	7,903	16,425
1991					198	4,206	473	2,473	1,855	98			9,303	0	200	360	7,163	7,723	17,026
1992					134	3,194	788	282	194	35			4,627	0	300	91	11,190	11,581	16,208
1993					88	1,602	2,505	1,862	570	25			6,652	0	200	257	12,765	13,222	19,874
1994						1,331	3,695	1,141	1,843	164			8,174	4,700	31,300	13,351	20,035	69,386	77,560
1995						5,444	4,016	1,303	1,542	119			12,424	13,200	59,800	19,482	15,749	108,231	120,655
1996					74	4,219	2,965	3,914	1,385				12,557	20,100	49,600	17,851	21,666	109,217	121,774
1997						7,585	5,802	1,708	1,387	55			16,537	12,200	59,800	22,731	25,905	120,636	137,173
1998						5,266	2,012	392	663	83	233		8,649	7,500	36,800	21,639	27,109	93,048	101,697
1999[2]						2 133	5 065		787	51			8 036	6,200	41,100	21 221	19 650	88 171	96 207
2000					111	3 085	4 022	588	1 095	0	12		8 913	16,500	44,100	25 485	17 570	103 655	112 568
2001						896	4 223	411	464	136			6 130	1,546	11,334	13 855	9 490	36 225	42 355
2002						951	3 195	756	253	95			5 250	0	604	1 152	953	2 709	7 959
2003[3]						971	5 962	1 325	954	55			9 267	4,738	11,259	7 855	11 532	35 384	44 651

[1] AF: Atlantic Flyway, MF: Mississippi Flyway, CF: Central Flyway, PF: Pacific Flyway.

[3] Harvest data for the U.S. are preliminary.
Data source: J.F Gobeil and B. Collins (CWS), and P. Padding (USFWS).

Table 11. Sea duck densities of survey area along the Atlantic Coast of Canada and the United States.

Densities measured per 100 km   No surveys were conducted in 1993, 1996 and 2003.

Species	1991	1992	1994	1995	1997	1998	1999	2000	2001	2002
Black Scoter	88	65	94	131	256	396	171	255	202	201
Surf Scoter	55	109	114	249	233	569	101	341	193	166
White-winged Scoter	40	17	13	117	85	35	127	13	64	87
Total Scoters	1162	358	226	507	576	1000	466	621	497	574
Long-tailed Duck	114	114	311	173	108	167	188	170	222	224
Common Eider	812	775	752	913	678	1419	1181	1717	675	823

[1] Total scoters includes unidentified species.

Data source: J. R. Goldsberry and J. Wortham (USFWS).

Table 12. Most abundant sea duck species in the traditional survey area of the Waterfowl Breeding Population and Habitat Survey; Trends in breeding population estimates.

Trends were calculated using the estimating equations technique (Link and Sauer 1994) and are expressed as an annual percentage change; the number of strata is given in parentheses (a minimum of 5 strata was deemed necessary to perform a trend analysis).

Species	Time Period	Region				Entire Survey Area
		Alaska (11 strata)	Western Boreal Canada (17 strata)	Canadian Prairies (15 strata)	U.S. Prairies (9 strata)	(52 strata)
Mergansers	1961-2004	6.0 * (11)	2.5 * (17)	2.4 * (14)	4.6 * (8)	2.6 * (50)
	1995-2004	-1.2 (11)	7.6 * (17)	-7.7 (13)	-3.0 (7)	6.5 * (48)
	2000-2004	-11.1 (11)	13.5 (17)	-32.1 * (11)	-26.5 * (6)	11.1 (45)
Goldeneyes	1961-2004	-0.3 (11)	1.5 * (17)	2.8 * (14)	0.0 (8)	1.4 * (50)
	1995-2004	4.2 (11)	-4.0 (17)	-0.7 (13)		-3.0 (44)
	2000-2004	5.9 (11)	-12.9 (14)	1.6 (13)		-9.6 (38)
Bufflehead	1961-2004	-0.1 (11)	1.8 * (17)	2.9 * (15)	3.7 * (8)	1.8 * (51)
	1995-2004	0.7 (11)	1.9 (17)	0.1 (15)	-6.2 (8)	1.4 (51)
	2000-2004	0.1 (9)	6.9 * (17)	-2.2 (14)	-20.8 (7)	4.6 * (47)
Long-tailed Duck	1961-2004	-1.5 * (11)	-3.3 * (12)			-2.7 * (25)
	1995-2004	0.8 (11)	1.0 (8)			0.9 (19)
	2000-2004	-7.3 (8)	20.7 (7)			6.1 (15)
Scoter spp.	1961-2004	-0.4 (11)	-1.2 * (17)	-4.5 * (12)		-1.1 * (41)
	1995-2004	0.3 (11)	3.6 (17)			2.5 * (33)
	2000-2004	6.3 (11)	10.0 (17)			9.2 (30)

* Trend significant at $P < 0.05$.

Table 13. Black Scoters Harvest estimates in Canada and the United States.

	Canada													United States[1]					Continental
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT/NU	YT	Total	AF	MF	CF	PF[2]	Total	Total
1974	2,239		1,300	17	5,555	3,646							12,757	21,000	3266	52	0	24,318	37,075
1975	126		2,788		11,105	11,628					23		25,670	16,100	2687	0	246	19,033	44,703
1976	2,711		5,231	245	17,217	6,853							32,257	8,900	2159	169	274	11,502	43,759
1977	5,210	94	3,547	40	25,536	3,671				90	198		38,386	15,300	4368	133	142	19,943	58,329
1978	365		2,106		6,351	1,999				92			10,913	7,900	242	0	0	8,142	19,055
1979	1,830		3,078	43	11,455	1,973					85	107	18,571	11,800	1095	69	0	12,964	31,535
1980	1,195		1,104		12,065	912							15,276	5,400	2430	0	0	7,830	23,106
1981	3,406		5,231	165	11,438	2,883				55			23,178	8,700	3213	185	145	12,243	35,421
1982	6,158		2,769		6,574	967							16,468	4,100	1068	355	0	5,523	21,991
1983	880		2,308	49	5,390	2,303				37			10,967	3,600	580	0	154	4,334	15,301
1984	2,024		1,536		7,756	2,074	330			57			13,777	10,600	749	94	206	11,649	25,426
1985	884	209	1,094		7,005	3,502							12,694	13,500	2299	76	0	15,875	28,569
1986	579		3,127		2,314	2,795						34	8,849	6,800	412	0	0	7,212	16,061
1987	572		1,359	678	7,195	843	414						11,061	9,900	228	0	0	10,128	21,189
1988	147		1,124	441	3,430	714							5,856	5,500	198	0	0	5,698	11,554
1989	463		650		5,006	705							6,824	5,400	1365	0	50	6,815	13,639
1990	377		1,114	202	3,856	1,455							7,004	12,000	148	0	35	12,183	19,187
1991	783		2,330	94	3,253	907							7,367	6,600	0	0	0	6,600	13,967
1992	969		1,769		1,477	669						24	4,908	4,600	315	0	0	4,915	9,823
1993	570		1,166		4,882	656	618						7,892	3,000	634	41	49	3,724	11,616
1994	298		3,216	54	2,297	549	971			29		165	7,579	5,700	1198	54	0	6,952	14,531
1995	1,543		1,978	149	679	563							4,912	3,000	100	0	0	3,100	8,012
1996	568		1,000	32	1,598	378							3,576	4,800	463	203	211	5,677	9,253
1997			1,324	43	2,202	205							3,774	4,500	940	105	123	5,668	9,442
1998	1,212	14	985	51	2,752	186							5,200	3,200	688	0	0	3,888	9,088
1999[3,4]	524		1,002		1,620	464							3,610	7,800	900	200	700	9,600	13,210
2000[4]	29		1,354	677	497	260							2,817	5,300	1000	0	0	6,300	9,117
2001[4]	928		2,646		947	682							5,203	5 800	800	0	0	6,600	11,803
2002[4]	838	158	1,462	72	610	243							3,383	10,800	800	0	0	11,600	14,983
2003[4]	536		821	74	655	221							2,307	17,800	1800	0	800	20,400	22,707

[1] AF: Atlantic Flyway, MF: Mississippi Flyway, CF: Central Flyway, PF: Pacific Flyway.

[2] Includes Alaska

[3] The USFWS recently implemented an improved national harvest survey. The results for years prior to 1999 are not directly comparable to those from 1999 onward.

[4] Harvest data for the U.S. are preliminary.

Data source: J.-F. Gobeil and B. Collins (CWS), and P. Padding (USFWS).

Table 14. White-winged Scoters Harvest estimates in Canada and the United States.

	Canada													United States[1]					Continental
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT/NU	YT	Total	AF	MF	CF	PF[2]	Total	Total
1974		113	1,105	46	9,676	4,611	291		251	174			16,267	26,700	6393	0	424	33,517	49,784
1975			1,742	233	4,934	4,277	141		357	143		54	11,881	33,000	1944	117	125	35,186	47,067
1976	95	204	2,792	193	8,245	4,122	396		648	61		164	16,920	18,100	497	565	1,010	20,172	37,092
1977			2,253		10,277	4,393	183		118	57		247	17,528	12,200	2341	257	1,531	16,329	33,857
1978	1,105	153	417	283	5,042	3,310		381	334	265			11,290	12,100	205	0	3,534	15,839	27,129
1979	565		989	117	8,018	5,845		364	172				16,070	8,730	966	0	748	10,444	26,514
1980	3,483		3,497	92	10,829	3,142				102			21,145	13,900	2284	34	792	17,010	38,155
1981	728		1,231	114	7,831	2,510				689	116		13,219	11,900	1644	126	1,172	14,842	28,061
1982	767		1,459	151	7,798	2,000			1,484	1,259			14,918	13,900	1269	0	172	15,341	30,259
1983	710		1,418	199	7,842	2,470		516		162			13,317	9,600	2339	0	177	12,116	25,433
1984	1,645	30	2,253		11,052	3,636					408		19,024	27,800	2283	0	3,970	34,053	53,077
1985	1,028		791	97	7,792	2,892	283		252	66	1,661		14,862	19,300	2074	36	425	21,835	36,697
1986	215		401	46	2,359	1,443		213		297			4,974	9,300	1142	0	276	10,718	15,692
1987			1,090	90	6,950	3,618			106	78			11,932	20,300	2885	101	1,019	24,305	36,237
1988	2,190		1,963	60	7,072	1,403				51			12,739	17,500	1086	0	134	18,720	31,459
1989	202		1,515	128	8,078	1,858							11,781	7,100	1197	70	43	8,410	20,191
1990	899		2,200	139	5,297	801	789						10,125	14,690	546	0	238	15,474	25,599
1991			465	90	2,505	1,096							4,156	18,391	1036	312	88	19,827	23,983
1992	283		1,638		5,213	441							7,575	10,992	661	151	0	11,804	19,379
1993	544	379	1,238	123	4,415	2,041	162				35		8,937	8,293	380	0	247	8,920	17,857
1994	344		2,132		5,932	1,343							9,751	5,594	738	111	240	6,683	16,434
1995			1,846		1,795	672							4,313	7,995	314	0	239	8,548	12,861
1996	89		1,034		2,464	1,175							4,762	9,996	3478	119	361	13,954	18,716
1997	58		1,191		2,306	470							4,025	6,800	568	0	499	7,867	11,892
1998	598		758	198	3,363	291							5,208	4,700	632	0	787	6,119	11,327
1999[3,4]	41		412		1,337	260						3	2,053	2,200	0	200	1,100	3,500	5,553
2000[4]	47		313		527	104					24		1,015	4,900	0	100	1,200	6,200	7,215
2001[4]	72		227	199	1,021	379	159	157		26			2,240	15,100	1500	0	6,600	23,200	25,440
2002[4]		158	680	52	1,179	282							2,351	7,300	800	200	800	9,100	11,451
2003[4]	409		636	43	789	97			173				2,147	6,800	1900	200	2,200	11,100	13,247

[1] AF: Atlantic Flyway, MF: Mississippi Flyway, CF: Central Flyway, PF: Pacific Flyway.

[2] Includes Alaska

[2] The USFWS recently implemented an improved national harvest survey. The results for years prior to 1999 are not directly comparable to those from 1999 onward.

[3] Harvest data for the U.S. are preliminary.

Data source: J.-F. Gobeil and B. Collins (CWS), and P. Padding (USFWS).

Table 15. Surf Scoters Harvest Estimates in Canada and the United States.

	Canada													United States[1]					Continental
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT/NU	YT	Total	AF	MF	CF	PF[2]	Total	Total
1974	1,074	34	2,714	243	9,757	2,645				322			16,789	22,200	4,381	59	746	27,386	44,175
1975		52	1,422	391	15,601	10,372	360	497		51			28,746	30,300	4,207		63	34,570	63,316
1976	4,357	714	7,220	1,168	20,035	8,684	566			77	69	41	42,931	16,300	442	308	1,117	18,167	61,098
1977	1,654	655	7,501	754	17,584	7,911							36,059	22,800	2,405	528	5,502	31,235	67,294
1978	671	54	1,279	640	8,842	3,118				207	45		14,856	14,700	512		1,842	17,054	31,910
1979	1,452		3,061	203	12,279	7,909							24,904	10,200	1,013		1,591	12,804	37,708
1980	1,569		4,190	655	10,321	5,162	89			103	634		22,723	9,800	874	201	1,056	11,931	34,654
1981	1,246		6,390	191	12,827	1,532	495			293	94		23,068	22,800	1,142		1,178	25,120	48,188
1982	9,936		2,776	355	14,879	1,285	260			171			29,662	5,800	635	633	952	8,020	37,682
1983	4,748		1,079		4,118	871	351		189	74	148		11,578	5,800	709	284	1,274	8,067	19,645
1984	4,145		2,957	152	7,942	3,063	284			307	112		18,962	18,300	1,980		7,092	27,372	46,334
1985	1,377		3,678	148	6,399	593	283			68	830		13,374	18,700	1,653		723	21,076	34,450
1986	2,338	82	2,456	186	2,060	1,994				29	124	34	9,303	19,100	844	295	344	20,583	29,886
1987	570		3,031	194	6,888	2,048		130		264			13,125	18,100	790		1,529	20,419	33,544
1988	987		2,397	282	7,331	634							11,631	6,300	241	79	2,094	8,714	20,345
1989	2,626		4,803		5,070	2,896				39			15,434	15,600	957		1,215	17,772	33,206
1990	3,410		7,552	432	5,184	1,152	714						18,444	14,900	301	131	632	15,964	34,408
1991	948		1,318	476	1,821	2,097	586	514					7,760	11,400	151	128	188	11,867	19,627
1992	655		1,399		3,479	577							6,110	11,200	377	124	221	11,922	18,032
1993	1,289	94	4,916	260	3,890	915	1,124			25	35	5	12,553	8,500	694	63	807	10,064	22,617
1994	3,601		7,683	69	6,890	669						35	18,947	16,100	787	141	46	17,074	36,021
1995	2264+614		4,686	592	3,448	971				34			9,731	6,600	2,916	221	777	10,514	20,245
1996	313		1,354	87	2,970	758							5,482	11,400	1,901	311	1,198	14,810	20,292
1997	325		2,694	290	3,029	442							6,780	9,700	457		2,157	12,314	19,094
1998	962	1,215	6,704	326	2,400	310					76		12,013	15,100	542	25	1,521	17,188	29,201
1999[3,4]	2,215		4,642	120	2,636	43	285						10,141	9,300	2,900	200	2,700	15,100	25,241
2000[4]	308		726	601	1,096	61							2,792	13,400	300	100	3,600	17,400	20,192
2001[4]	520		806	108	1,549								2,983	26,800	300	100	1,500	28,700	31,683
2002[4]	1,951	158	922	72	2,314	70				42			5,529	20,100	1,000	100	2,700	23,900	29,429
2003[4]	706		1,588	15	636	349							3,294	38,500	1,100	200	400	40,200	43,494

[1] AF: Atlantic Flyway, MF: Mississippi Flyway, CF: Central Flyway, PF: Pacific Flyway.

[2] Includes Alaska

[2] The USFWS recently implemented an improved national harvest survey. The results for years prior to 1999 are not directly comparable to those from 1999 onward.

[3] Harvest data for the U.S. are preliminary.

Data source: J.-F. Gobeil and B. Collins (CWS), and P. Padding (USFWS).

Table 16. Abundant sea duck species in the Black Duck Breeding Ground Survey area of Eastern Canada; trends in indicated breeding pairs for the 1990-2004 period.

Trends are expressed as an annual percentage change; the number of plots used in the analysis is given in parentheses (Collins 2004).

	Region				
Species	**Atlantic highlands (78 plots)**	**Boreal shield eastern (82 plots)**	**Boreal shield central (80 plots)**	**Boreal shield western (64 plots)**	**Entire survey area (304 plots)**
Common Merganser	3.3 n (65)	2.9 (77)	-0.3 (77)	1.9 (57)	1.8 * (275)
Red-breasted Merganser	14.8 (19)	-1.9 (26)			-2.8 (55)
Hooded Merganser	22.1 * (42)	4.9 (24)	6.8 * (65)	2.3 * (59)	4.3 * (186)
Common Goldeneye	7.5 (36)	2.1 (80)	2.7 * (79)	3.7 * (53)	3.7 * (245)
Barrow's Goldeneye		-6.2 (27)			-5.5 (28)
Bufflehead			5.4 (28)	-4.9 n (39)	-4.5 n (69)
Surf Scoter		11.9 (37)	0.2 (16)		12.3 * (58)

* Trend significant at $P < 0.05$.
'n' Trends close to significant at $P < 0.05$
Note: a minimum of 10 plots with at least 2 years with non-zero counts were needed to perform the trend analysis.

Table 17. Greater Snow Geese Harvest estimates in Canada and the United States.

An unknown proportion of the U.S. harvest is comprised of Lesser Snow Geese (harvest estimates of Snow Geese are combined in the U.S.)

	Canada													**United States[1]**		**Continental**
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT/NU	YT	Total	AF	Total	Total
1975					30,708		154						30,862	9,200	9,200	40,062
1976					27,854	108							27,962	12,100	12,100	40,062
1977														22,200	22,200	22,200
1978					41,748	1,263		276	295				43,582	20,100	20,100	63,682
1979					23,619								23,619	28,000	28,000	51,619
1980					55,847	151							55,998	27,300	27,300	83,298
1981			25		24,170	110							24,305	13,500	13,500	37,805
1982			47		40,462	655	148	352					41,664	21,700	21,700	63,364
1983														40,400	40,400	40,400
1984	166				44,983	589	3,111	784					49,633	37,600	37,600	87,233
1985					24,370								24,370	14,800	14,800	39,170
1986				72	10,536								10,608	8,900	8,900	19,508
1987					756								756	28,500	28,500	29,256
1988					41,365			93					41,458	24,900	24,900	66,358
1989					43,529	249							43,778	17,100	17,100	60,878
1990	287				60,647				204				61,138	21,500	21,500	82,638
1991					47,697		724						48,421	26,400	26,400	74,821
1992				295	26,984	926	759	215					29,179	10,400	10,400	39,579
1993					97,534	429	1,938	2,282					102,183	30,400	30,400	132,583
1994					35,903	112							36,015	17,600	17,600	53,615
1995			21		50,267	252	391						50,931	18,800	18,800	69,731
1996	60		62	1,859	66,111	111	115						68,318	31,400	31,400	99,718
1997					55,056	164							55,220	34,700	34,700	89,920
1998			90	412	86,791	64			118				87,475	110,900	110,900	198,375
1999[2]				774	36,821	105			86				37,786	39,100	39,100	76,886
2000					103,615			554	334				104,503	47,000	47,000	151,503
2001					94,009				67				94,076	77,802	77,802	171,878
2002				225	45,888			531	219				46,863	39,295	39,295	86,158
2003[3]					86,854	99		214		143			87,310	36,105	36,105	123,415

[3] Harvest data for the U.S. are preliminary.

Table 18. Lesser Snow Geese Harvest Estimates of in Canada and the United States.

In the U.S., an unknown proportion of Lesser Snow Geese are also harvested in the Atlantic Flyway and are included with the Greater Snow Goose estimates (Table 10a).

	Canada													**United States**[1]				**Continental**
	NF	**PE**	**NS**	**NB**	**QC**	**ON**	**MB**	**SK**	**AB**	**BC**	**NT/NU**	**YT**	**Total**	**MF**	**CF**	**PF**	**Total**	**Total**
1975					5,578	15,742	51,708	12,692	16,339	2,972	324		105,355	167,700	350,057	92,871	610,628	715,983
1976					192	11,519	31,449	20,721	30,741	1,102	177		95,901	102,500	256,490	144,011	503,001	598,902
1977					19,653	8,000	31,850	12,151	30,731	576			102,961	126,800	306,302	81,841	514,943	617,904
1978			30		542	6,201	39,770	11,619	16,819	401			75,382	133,900	189,015	30,925	353,840	429,222
1979					5,379	10,576	99,151	12,981	10,752	1,917	552		141,308	165,600	338,391	32,628	536,619	677,927
1980			50		12,762	8,710	91,968	16,172	9,498	1,725			140,885	144,600	251,765	35,766	432,131	573,016
1981					408	6,576	88,124	15,339	13,780	3,378			127,605	110,900	289,869	61,109	461,878	589,483
1982					1,712	2,666	82,094	22,845	6,010	2,666			117,993	124,200	241,744	33,074	399,018	517,011
1983					45,351	1,820	82,602	33,377	6,802				169,952	187,300	245,748	46,829	479,877	649,829
1984					2,503	1,205	76,472	31,919	8,265	2,700			123,064	101,800	292,798	64,426	459,024	582,088
1985			49		497	1,913	105,719	33,311	11,362	3,972			156,823	99,200	216,868	82,223	398,291	555,114
1986						2,335	49,587	32,129	9,679				93,730	69,700	149,889	37,384	256,973	350,703
1987					19,137	6,169	70,849	22,976	3,980	2,329			125,440	56,400	182,585	38,236	277,221	402,661
1988					3,864	2,231	71,733	24,321	9,583	1,556			113,288	51,700	251,836	42,134	345,670	458,958
1989					1,169	5,654	92,720	27,321	11,274	926			139,064	97,300	286,271	32,955	416,526	555,590
1990				448	2,293	2,742	54,027	32,541	10,504	137	339	407	103,438	92,900	211,758	26,802	331,460	434,898
1991					2,645	2,799	66,254	22,224	5,600	2,619			102,141	110,900	249,950	30,999	391,849	493,990
1992			58		592	590	26,778	21,240	9,123	467			58,848	60,100	149,484	29,281	238,865	297,713
1993					7,641	2,543	51,301	19,674	5,303	2,094			88,556	71,800	270,235	55,293	397,328	485,884
1994					5,855	657	56,221	30,258	6,987	2,174	105		102,257	99,100	270,502	29,410	399,012	501,269
1995					855	1,286	61,603	31,323	8,680	1,589	306		105,642	191,200	331,957	37,807	560,964	666,606
1996					3,486	1,028	46,163	34,546	4,185	2,863			92,271	231,100	299,215	59,042	589,357	681,628
1997					8,853	336	69,683	62,635	9,261				150,768	239,000	348,989	35,501	623,490	774,258
1998				16	16,732	954	52,121	68,985	14,890	1,797			155,495	394,700	295,774	52,395	742,869	898,364
1999[2]					6,747	115	14,150	116,313	15,416	1,990			154,731	317,412	487,753	51,190	856,355	1,011,086
2000					5,686	1,350	31,697	68,377	12,881	2,559	45		122,595	234,699	380,158	39,039	653,896	776,491
2001					4,425	981	25,334	100,521	13,365	2,354			146,980	315,508	345,139	44,572	705,219	852,199
2002					2,699	696	24,250	85,929	9,610	2,536			125,720	197,297	268,572	46,526	512,395	638,115
2003[3]					4,030	816	28,354	107,230	10,179	1,839			152,448	286,279	247,982	42,607	576,868	729,316

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[1] MF: Mississippi Flyway, CF: Central Flyway, PF: Pacific Flyway.

[2] The USFWS recently implemented an improved national harvest survey. The results for years prior to 1999 are not directly comparable to those from 1999 onward.

[3] Harvest data for the U.S. are preliminary.

Data source: J.-F. Gobeil and B. Collins (CWS), and P. Padding (USFWS).

Table 19. Canada Geese Harvest Estimates (all populations combined) in Canada and the United States.

	Canada													United States[1]					Continental
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT/NU	YT	Total	AF	MF	CF	PF	Total	Total
1974													0	338,700	289,000	133,136	188,413	949,249	949,249
1975	8,185	6,382	8,836	2,182	12,791	33,441	94,330	96,197	85,708	8,913		142	357,107	357,900	330,400	172,717	181,394	1,042,411	1,399,518
1976	8,443	17,961	11,024	6,699	25,242	37,595	65,152	70,643	67,964	6,848	36	165	317,772	366,700	340,600	172,467	172,169	1,051,936	1,369,708
1977	12,578	18,788	8,563	2,451	52,300	57,626	44,236	66,429	59,302	8,758	218	127	331,376	465,900	357,600	158,871	185,209	1,167,580	1,498,956
1978	12,743	11,972	6,571	3,412	66,437	53,019	83,032	70,426	77,647	10,800		338	396,397	327,000	425,800	200,815	252,894	1,206,509	1,602,906
1979	13,401	10,827	5,261	2,614	50,012	64,249	94,496	79,544	79,636	12,931		289	413,260	296,900	325,300	185,740	187,396	995,336	1,408,596
1980	10,938	19,137	8,230	2,594	52,076	73,794	73,810	96,446	100,045	16,656	435	525	454,686	474,900	316,300	187,176	187,925	1,166,301	1,620,987
1981	10,202	14,264	7,384	3,744	25,291	49,902	57,927	84,914	95,051	15,843		233	364,755	328,800	308,900	206,747	195,003	1,039,450	1,404,205
1982	11,186	13,296	5,409	2,584	29,680	69,828	73,788	87,249	97,569	14,479		0	405,068	383,700	290,100	213,544	206,567	1,093,911	1,498,979
1983	13,652	15,768	9,534	7,370	37,429	69,648	71,671	127,184	108,097	14,877		397	475,627	491,000	288,800	233,447	230,178	1,243,425	1,719,052
1984	14,086	13,963	6,465	3,019	22,906	63,187	88,745	95,993	96,065	15,841		267	420,537	408,900	310,400	235,786	199,428	1,154,514	1,575,051
1985	9,669	17,226	6,829	4,071	28,132	76,234	103,441	88,407	103,077	18,510		96	455,692	360,800	336,100	289,670	200,861	1,187,431	1,643,123
1986	16,770	21,912	8,794	5,660	39,193	83,746	91,603	80,714	88,943	14,853		190	452,378	413,900	337,000	212,901	147,111	1,110,912	1,563,290
1987	12,509	21,387	10,942	3,015	80,270	87,481	78,007	106,528	124,796	14,830	550	165	540,480	359,300	319,700	198,227	162,742	1,039,969	1,580,449
1988	9,379	24,906	9,676	3,377	20,454	76,537	56,025	80,044	99,376	15,266		174	395,214	268,900	446,200	240,786	163,230	1,119,116	1,514,330
1989	8,845	23,143	15,666	6,629	55,852	101,581	77,752	84,582	121,589	16,418	367	0	512,424	318,500	580,100	273,324	149,204	1,321,128	1,833,552
1990	6,379	25,177	6,570	7,285	54,740	97,556	73,645	96,272	125,398	14,835	96	0	507,953	302,000	510,400	282,879	184,871	1,280,150	1,788,103
1991	5,885	21,459	9,850	5,229	52,837	83,804	72,184	91,645	112,050	18,227	275	510	473,955	306,200	543,600	276,400	174,951	1,301,151	1,775,106
1992	6,436	11,640	4,288	5,350	27,188	79,880	57,470	81,009	91,104	15,961		154	380,480	247,400	484,300	223,610	196,798	1,152,108	1,532,588
1993	9,759	19,168	13,295	6,916	40,609	83,889	73,581	79,823	93,614	13,509		94	434,257	286,900	598,900	319,462	223,384	1,428,646	1,862,903
1994	6,924	28,216	6,935	5,820	15,879	85,233	60,302	82,753	107,925	14,072	21	140	414,220	306,400	644,400	382,799	259,035	1,592,634	2,006,854
1995	9,527	16,967	8,306	5,467	9,560	88,140	49,639	82,155	114,818	11,297		128	396,004	144,000	771,800	483,322	239,096	1,638,218	2,034,222
1996	7,503	22,451	8,758	4,470	10,822	87,781	93,437	111,467	137,440	15,477	417	82	500,105	219,400	814,800	610,074	268,314	1,912,588	2,412,693
1997	5,165	16,769	7,542	6,105	11,748	89,680	107,304	104,934	125,629	14,602		0	489,478	296,200	833,400	546,274	242,559	1,918,433	2,407,911
1998	9,746	23,781	10,802	6,225	16,882	109,731	94,033	136,736	104,831	18,586		0	531,353	330,600	738,900	672,326	272,552	2,014,378	2,545,731
1999[2]	5,464	32,944	12,633	6,079	38,702	100,751	68,822	146,112	137,527	16,093	25	90	565,242	342,800	813,400	493,320	234,350	1,883,870	2,449,112
2000	8,223	25,932	13,507	8,418	38,941	125,308	74,629	167,929	132,609	16,544	13		612,053	371,000	896,400	662,562	315,925	2,245,887	2,857,940
2001	5,553	25,135	10,554	5,614	67,760	148,703	102,031	146,827	111,748	13,072			636,997	687,904	858,422	627,052	279,469	2,452,847	3,089,844
2002	6,743	22,125	10,831	4,961	87,175	160,472	108,303	125,583	108,757	15,069		239	650,258	716,689	906,351	587,253	270,148	2,480,441	3,130,699
2003[3]	5,003	20,982	4,913	11,244	111,882	160,319	88,717	136,929	117,133	13,656			670,778	657,910	1,103,880	734,402	359,383	2,855,575	3,526,353

[3] Harvest data for the U.S. are preliminary.

Table 20. White-fronted Goose Harvest Estimates in Canada and the United States.

	Canada													United States[1]					Continental
	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	NT/NU	YT	Total	AF	MF	CF	PF	Total	Total
1974															10,102	34,623	41,592	86,317	86,317
1975			280				451	45686	14343	387	121	141	61,409		29,282	47,621	38,485	115,388	176,797
1976							824	51876	9300			44	62,044		22,248	32,959	46,010	101,217	163,261
1977								43339	15860	82		1	59,282		18,660	49,154	35,566	103,380	162,662
1978							379	50985	11342	246		121	63,073		33,376	44,179	38,021	115,576	178,649
1979							100	47197	12092	71		247	59,707		29,119	54,655	24,395	108,169	167,876
1980							2308	56164	20036	60			78,568	105	28,097	74,884	20,874	123,960	202,528
1981							1503	36780	14647	301		4	53,235		94,871	80,886	22,851	198,608	251,843
1982							263	39822	15434				55,519	486	51,421	63,017	16,772	131,696	187,215
1983							118	46945	5633		569		53,265	257	61,646	51,828	17,137	130,868	184,133
1984						152	115	38794	14365	126		36	53,588	67	67,160	78,197	8,306	153,730	207,318
1985								37604	12481	277		64	50,426	77	46,812	51,473	15,671	114,033	164,459
1986					23		497	37750	20597				58,867		34,016	33,891	8,836	76,743	135,610
1987							125	36854	11184	84			48,247		32,148	55,016	10,962	98,126	146,373
1988								21642	18125	101			39,868		33,802	61,721	6,385	101,908	141,776
1989			42			44	119	34372	18737	47			53,361		47,655	80,462	11,479	139,596	192,957
1990	294						110	26848	16524	115	96		43,987		70,202	73,011	8,395	151,608	195,595
1991			51		82		548	31648	11538	65			43,932		72,199	54,510	11,658	138,367	182,299
1992							622	22098	8649	23			31,392		54,500	41,207	14,219	109,926	141,318
1993			49			171		21822	7016				29,058		42,000	64,830	13,839	120,669	149,727
1994								30198	9606	79			39,883		87,700	61,771	14,131	163,602	203,485
1995							79	45010	14886	41			60,016		68,600	60,880	13,523	143,003	203,019
1996			251			68	924	57674	17939	137			76,993		117,000	75,875	21,642	214,517	291,510
1997					179		296	37324	15009			36	52,844		122,400	59,913	27,205	209,518	262,362
1998							1045	51202	26669	242			79,158		108,800	51,225	25,294	185,319	264,477
1999[2]								47314	15032				62,346		111,434	114,010	29,458	254,902	317,248
2000								86586	19963	187			106,736		100,610	182,344	25,018	307,972	414,708
2001								61389	31722	79			93,190		108,928	91,438	29,307	229,673	322,863
2002							1048	39870	10690	60		5	51,673		108,685	77,179	33,453	219,317	270,990
2003[3]						76		48987	15293	182			64,538		110,611	80,017	26,153	216,781	281,319

[3] Harvest data for the U.S. are preliminary.